TN
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C3755
no.2
v.8

U.S. DEPARTMENT OF THE INTERIOR

PROTOTYPE OIL SHALE LEASING PROGRAM

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TRACT C-b

QUARTERLY REPORT #2

(Through February 28, 1975)

Submitted to:

Mr. Peter A. Rutledge
Area Oil Shale Supervisor
Conservation District
U. S. Geological Survey
Grand Junction, Colorado

By:

Ashland Oil, Inc.
Atlantic Richfield Company, Operator
Shell Oil Company
The Oil Shale Corporation

APRIL 14, 1975

SHOUT
SHARE
IT

QUARTERLY REPORT #2

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Schlumberger

BOREHOLE COMPENSATE
SONIC LOG - GAMMA RA

(WITH CALIPER)

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL S. G. NO. 9
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location:

Sec. 11 Twp. 3S Rge. 97W

Other Services:
FDC-GR
DIL
TEMP

Permanent Datum: GL ; Elev.: 6870
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 687
D.F.
G.L. 687

Date	10-24-74			
Run No.	ONE			
Depth—Driller	2750			
Depth—Logger	2740			
Btm. Log Interval	2737			
Top Log Interval	472			
Casing—Driller	7 @ 64	@	@	@
Casing—Logger				
Bit Size	6-3/4			
Type Fluid in Hole	WATER & SOAP			
Fluid Level				
Dens. | Visc.				
pH | Fluid Los	ml	ml	ml	
Source of Sample	PIT			
Rm @ Meas. Temp.	5.12 @ 72 °F	5.54 @72 °F	5.51 @ 72 °F	@
Rmf @ Meas. Temp.	@ °F	@ °F	@ °F	@
Rmc @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: Rmf | Rmc				
Rm @ BHT	@ °F	@ °F	@ °F	@
Time Since Circ.	19 HOURS			
Max. Rec. Temp.	132 °F	°F	°F	
Equip. | Location	5602 | GJ			
Recorded By	BARGHOUTI			
Witnessed By	BURNS			

SWS–1383-F

°F °F °F °F °F ml

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.			
Depth - Driller				
Type Fluid in Hole				
Dens.	Visc.			
ph	Fluid Loss	ml		ml
Source of Sample				
R_m @ Meas. Temp.		@ °F		@ °F
R_{mf} @ Meas. Temp.		@ °F		@ °F
R_{mc} @ Meas. Temp.		@ °F		@ °F
Source: R_{mf}	R_{mc}			
R_m @ BHT		@ °F		@ °F
R_{mf} @ BHT		@ °F		@ °F
R_{mc} @ BHT		@ °F		@ °F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Sonic Panel No.	JD-438			
Sonic Cart No.	A-166			
Sonic Sonde No.	D-499			
Mem. Panel No.		236		
G.R. Cart. No.		289		
G.R. Panel No.		169		
Caliper No		851		
TTR No.		----		
Cent. Device		T.C.2		
Stand off - Inches		2"		
Time Const. - Sec.				
Speed - F.P.M.		30'		

REMARKS

Service Order No. - 22425

API Serial No. -

NOTE AMP-VDL RUN ± 10' OFF FROM
BHC AS IT WAS MEASURED FROM K.B.
VDL NOT RERUN ON DEPTH AS TOOL
SENT TO FARMINGTON BEFORE MISTAKE
REALIZED.

NOTE ODD TR & SPACING

	SCALES OF VDL 3'-5' AMP-VDL
*6 3/4	1200-2750
7 7/8	64-1200
8 5/8	0-64

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.	RECORDING SPEED (FT./MIN.)
GAMMA RAY:	90	530	100	150	150	2	30

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

GAMMA RAY
API UNITS

0 150
150 300

CALIPER
HOLE DIAM. IN INCHES

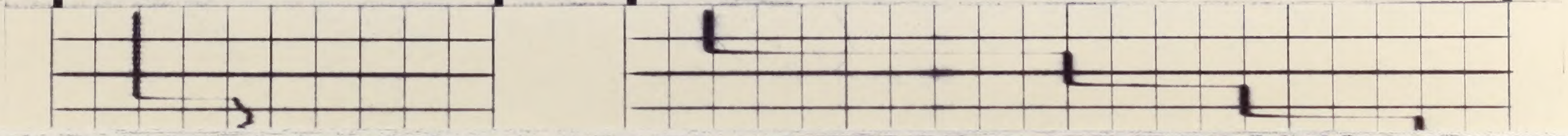
6 16

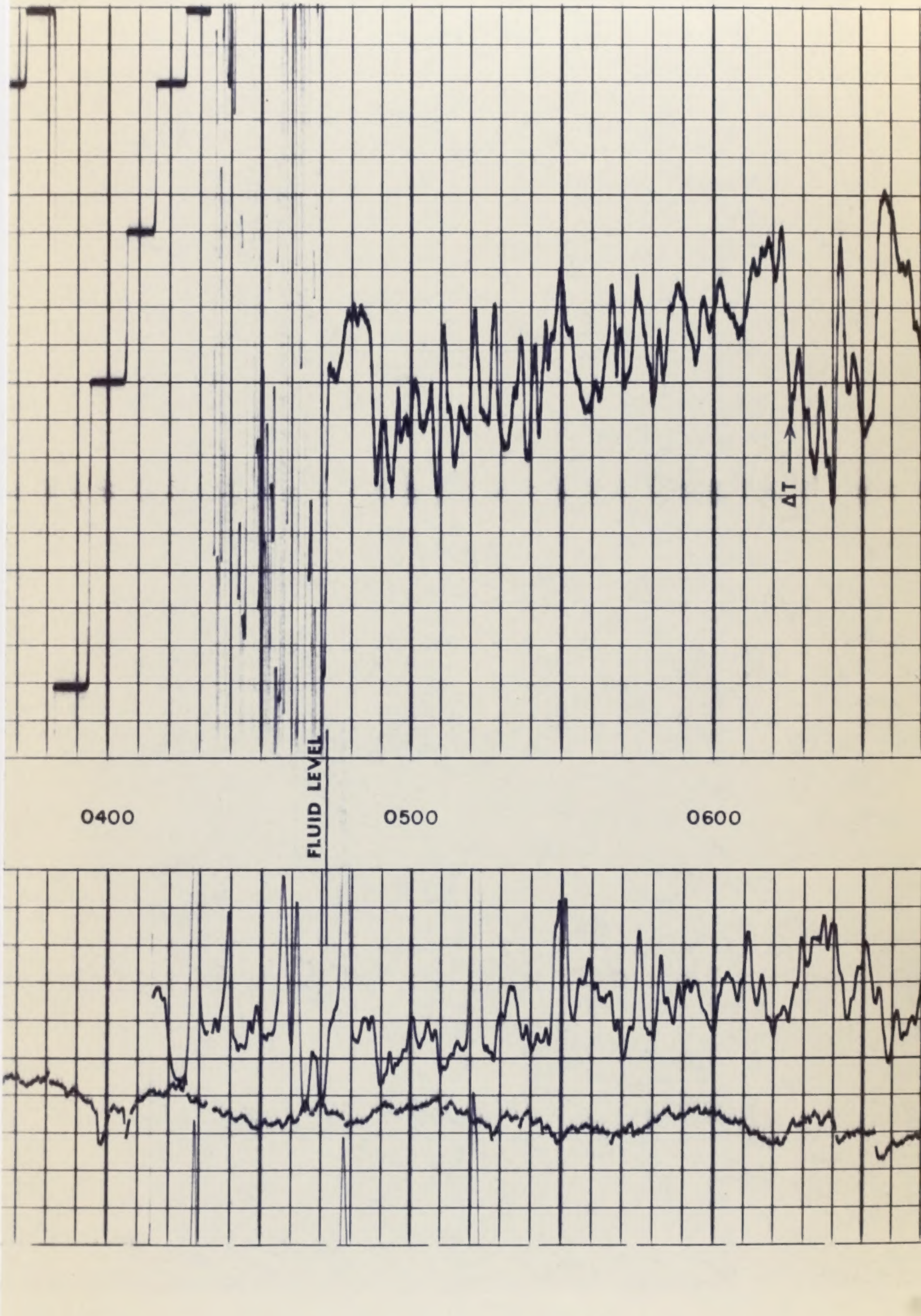
DEPTHS

INTERVAL TRANSIT TIME
MICROSECONDS PER FOOT

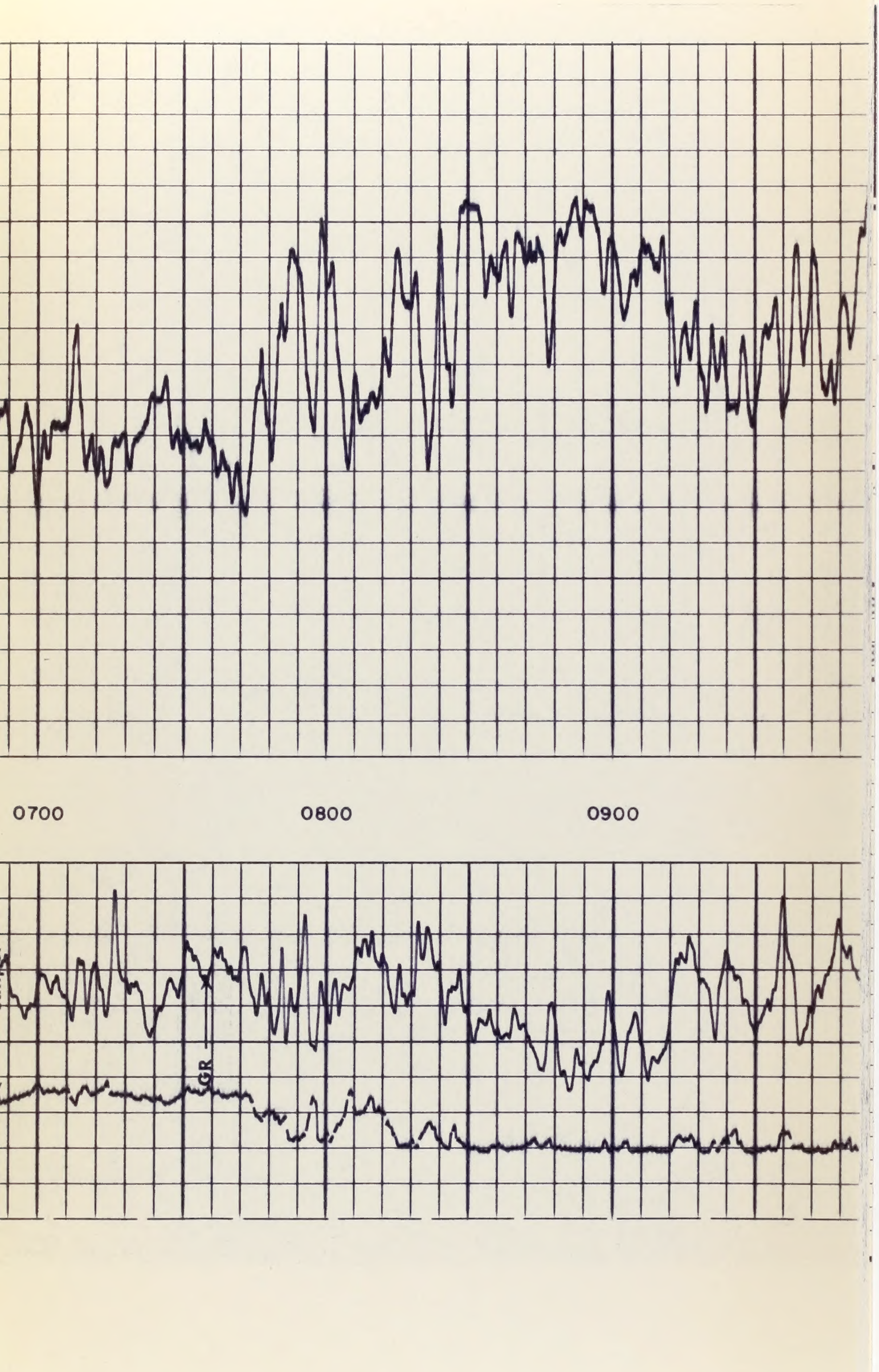
T 3 R₁ 2 R₂

150 100 50
250 200 150





FLUID LEVEL
0400
0500
0600
ΔT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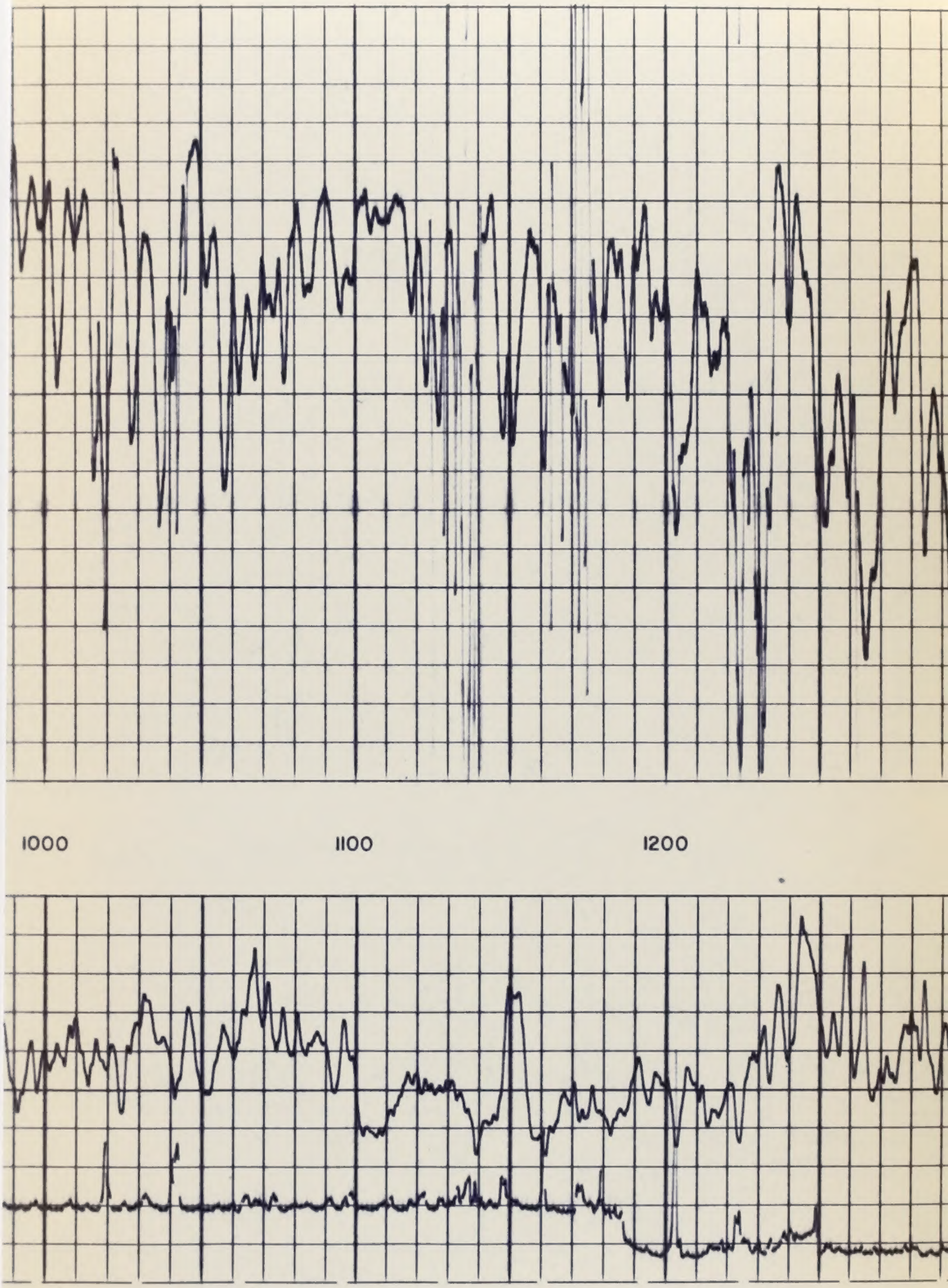
0800
0900
GR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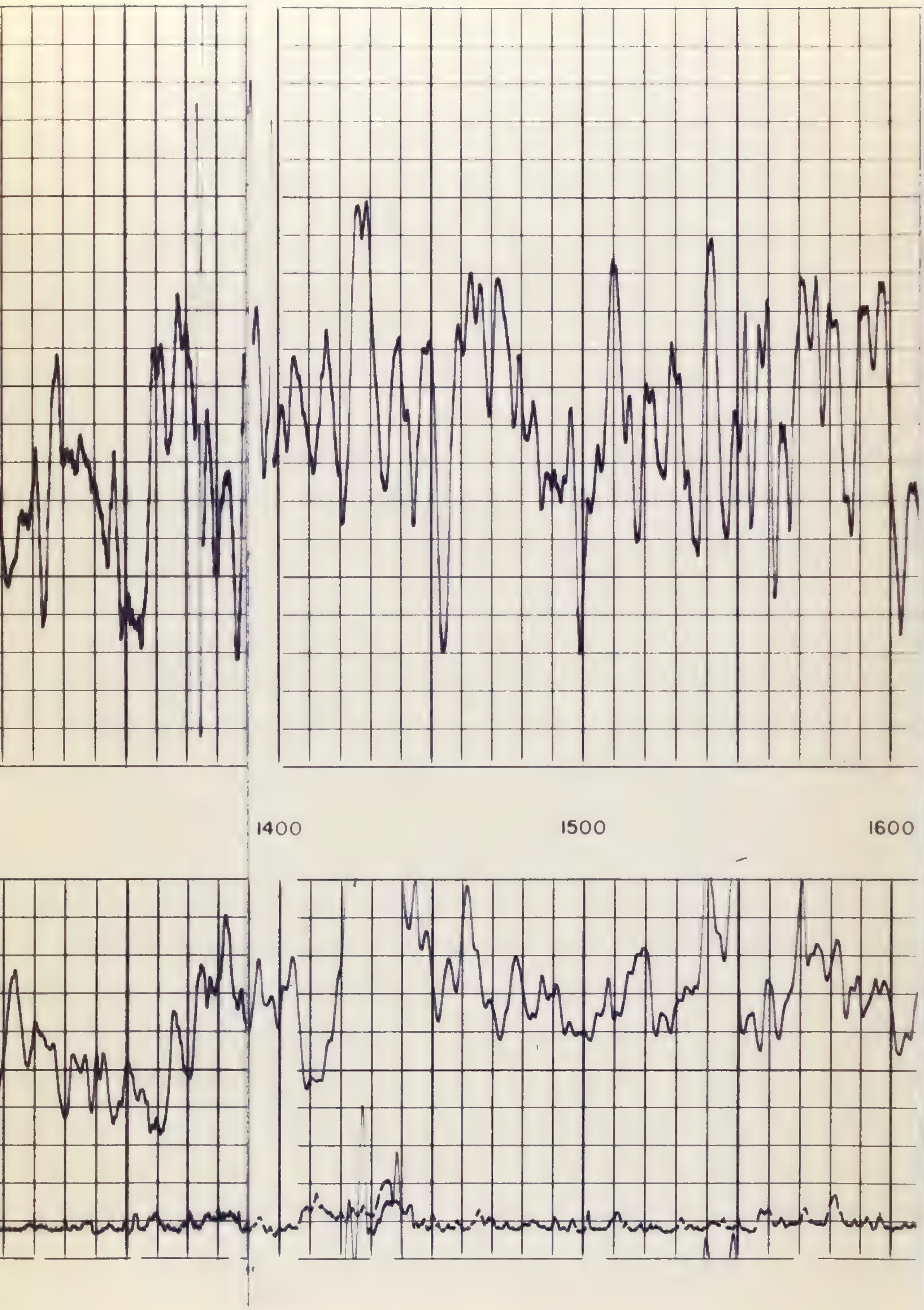
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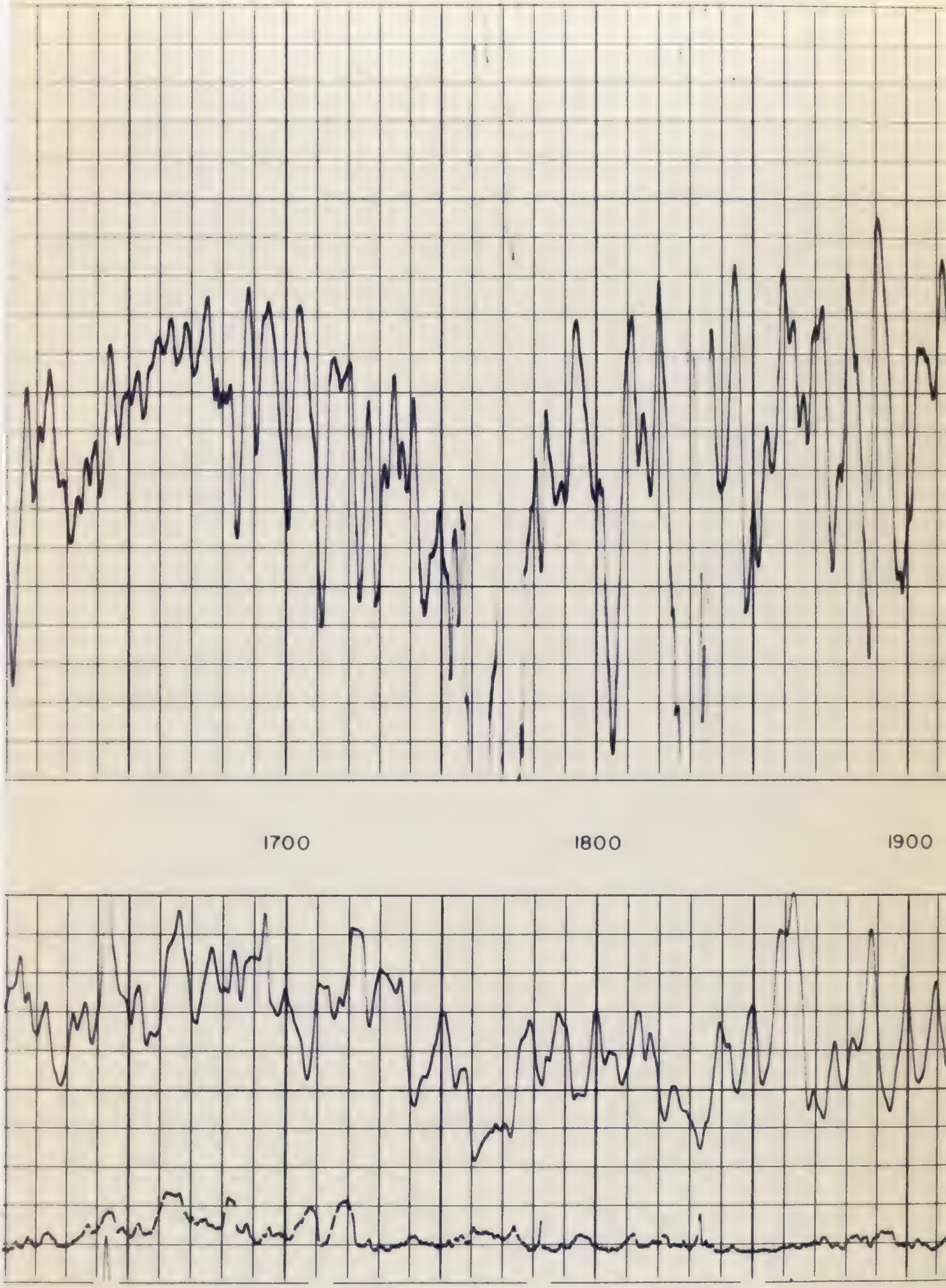
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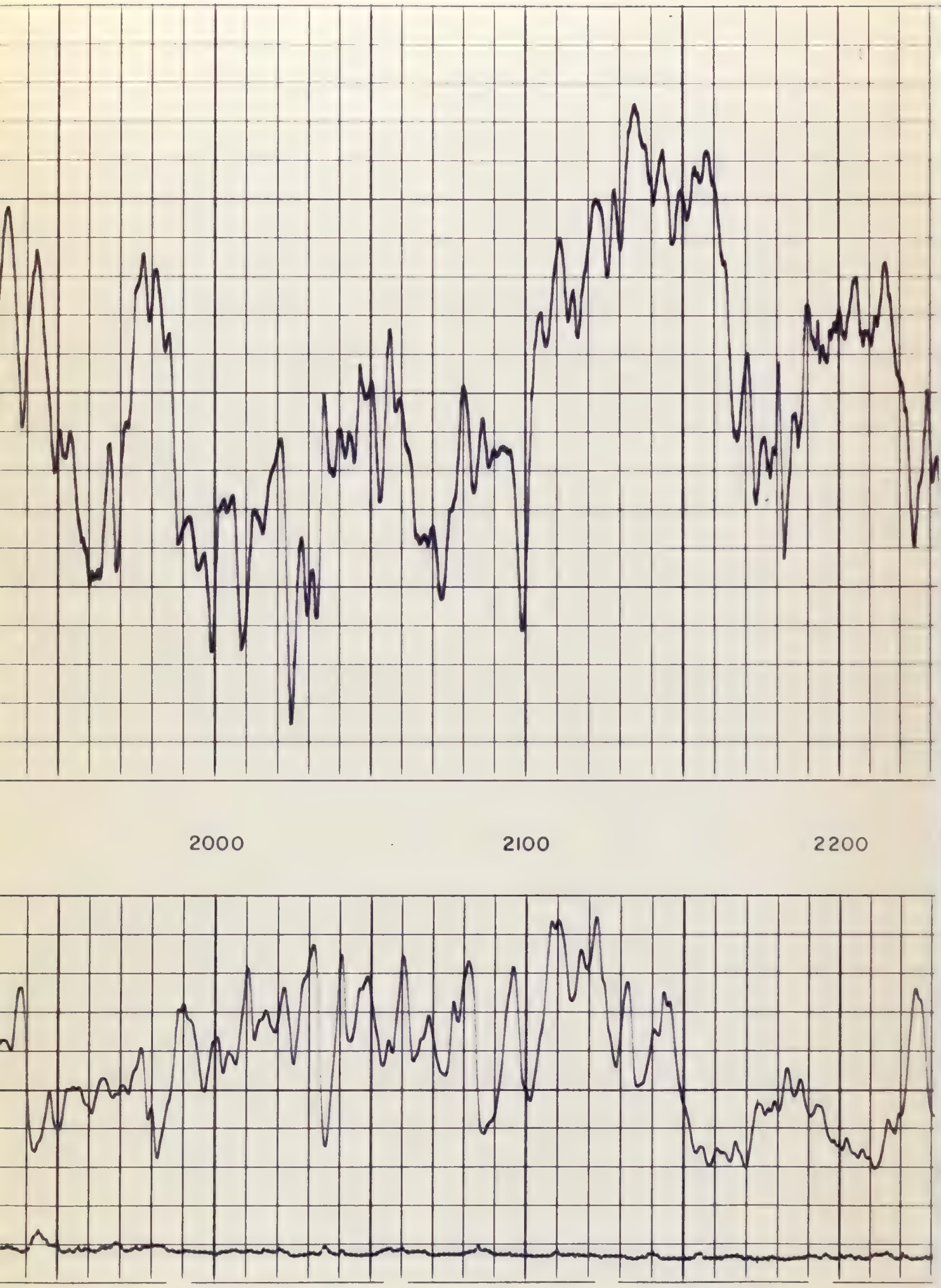
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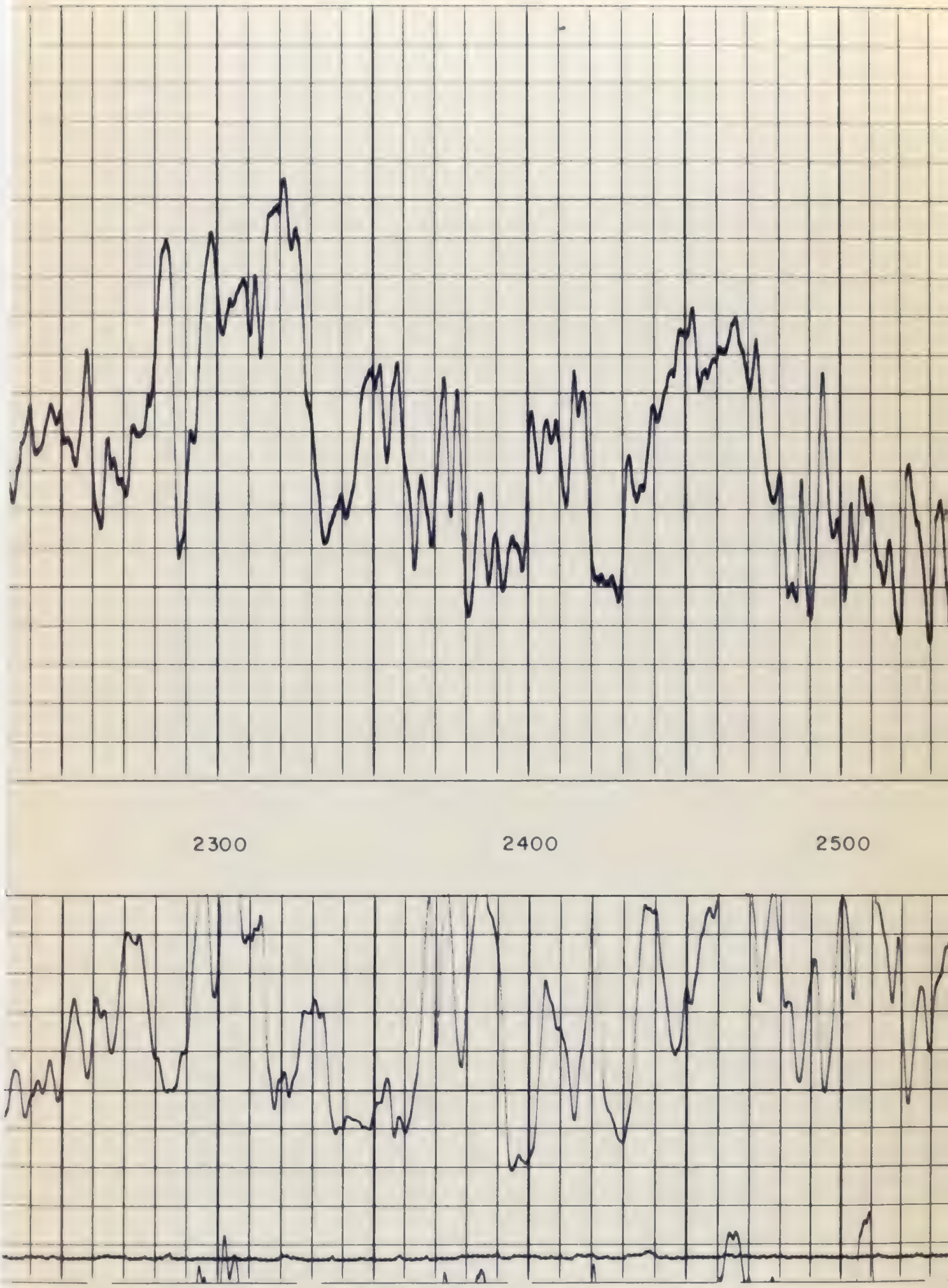
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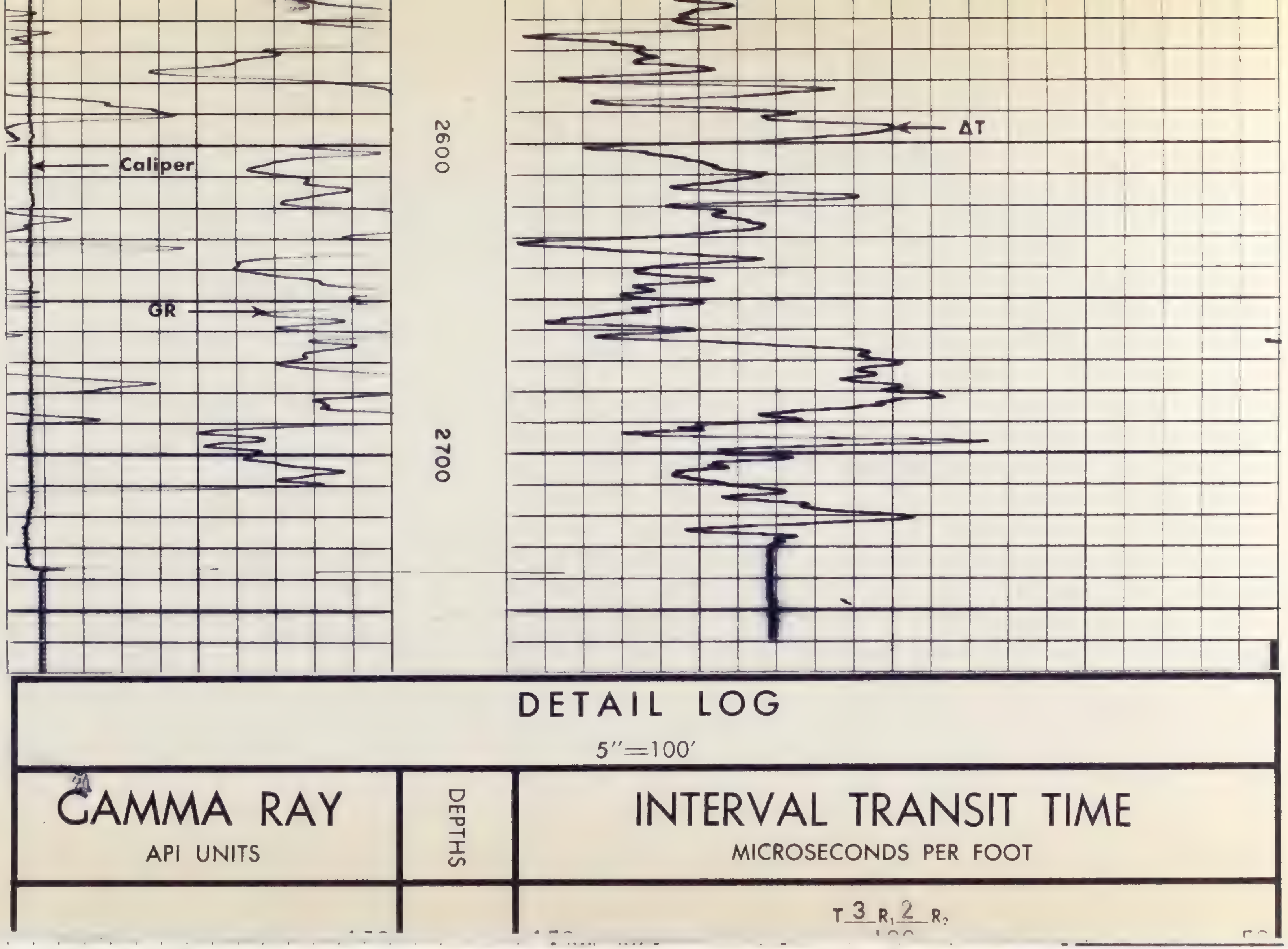
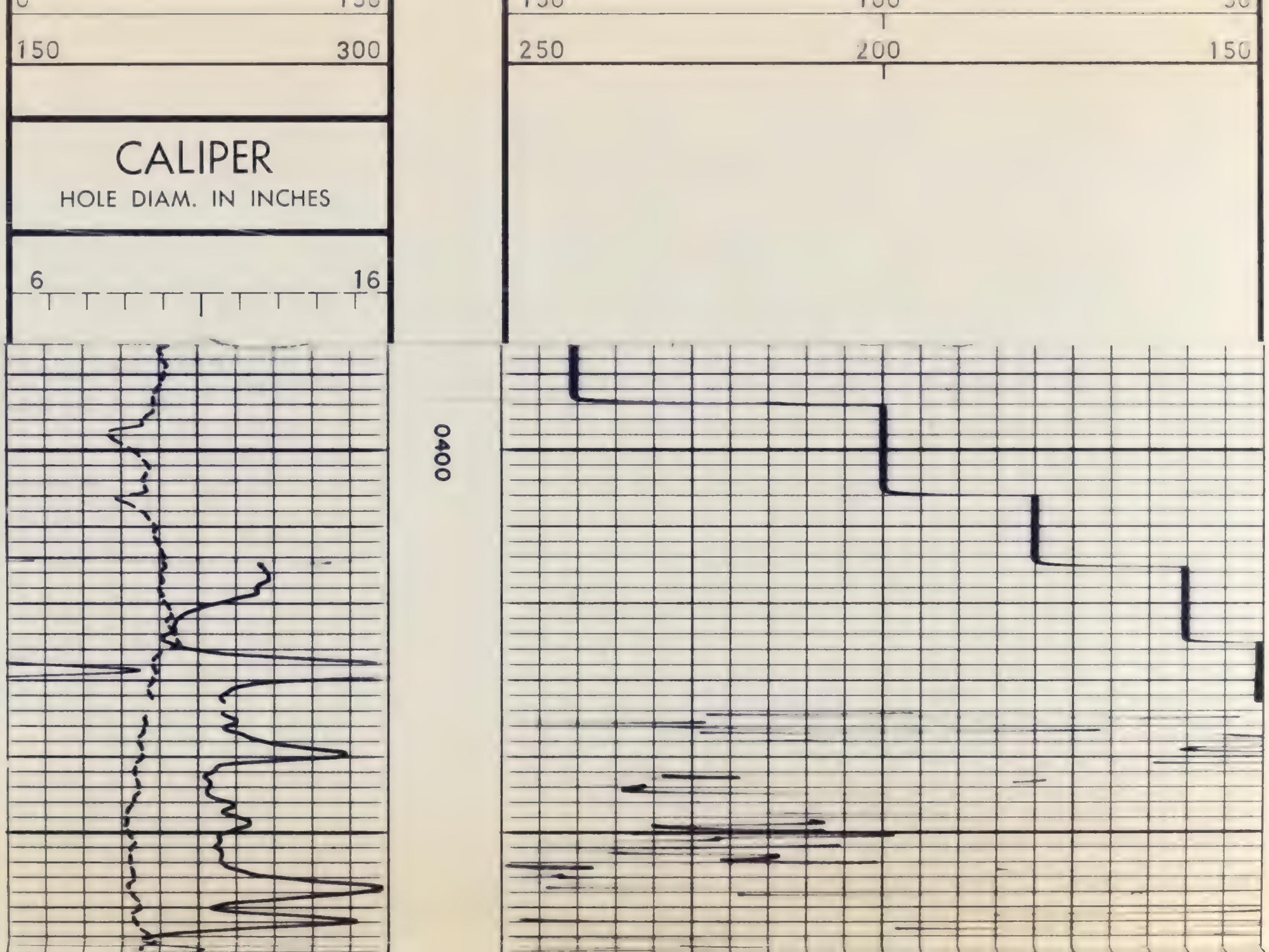
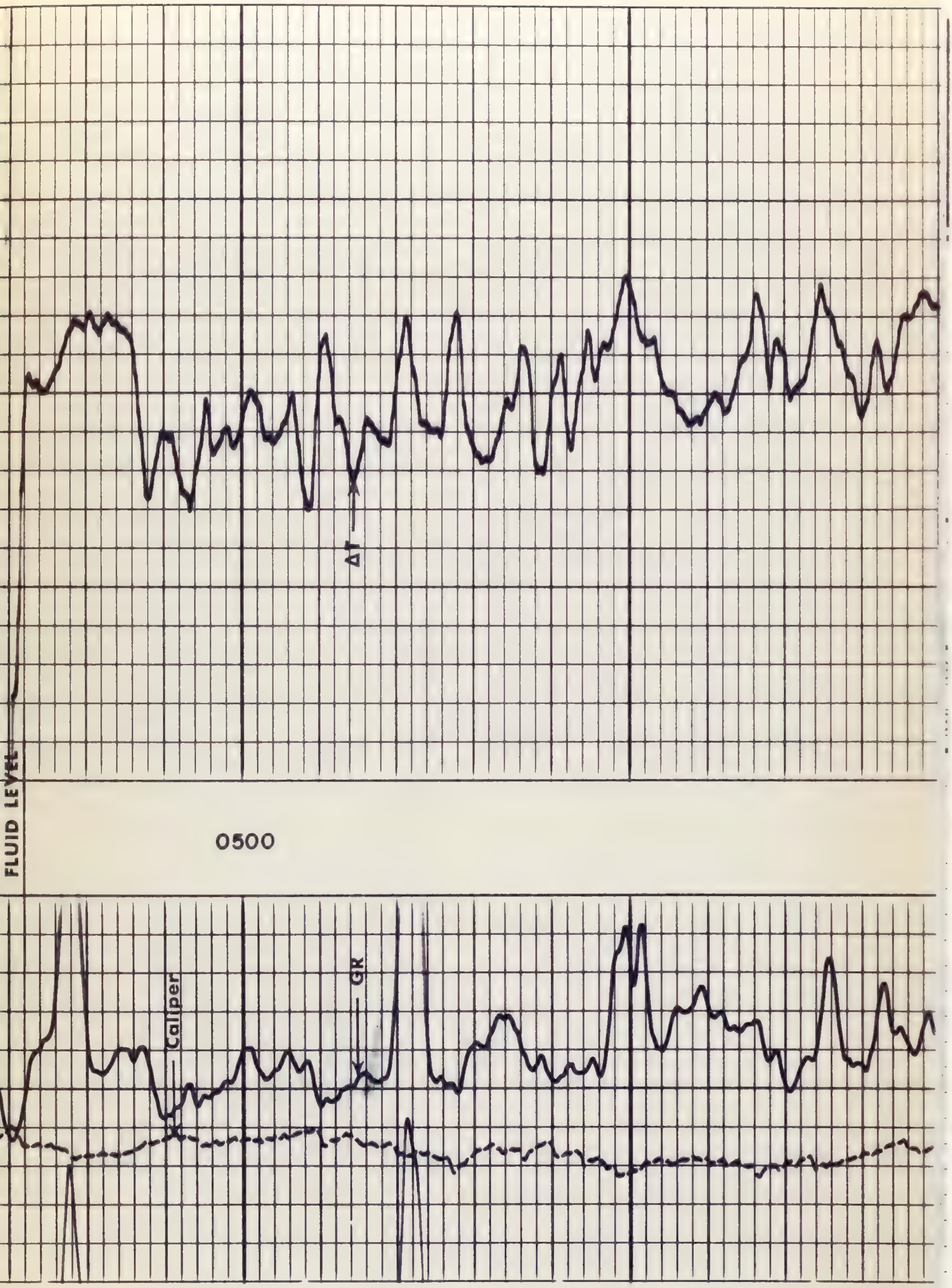
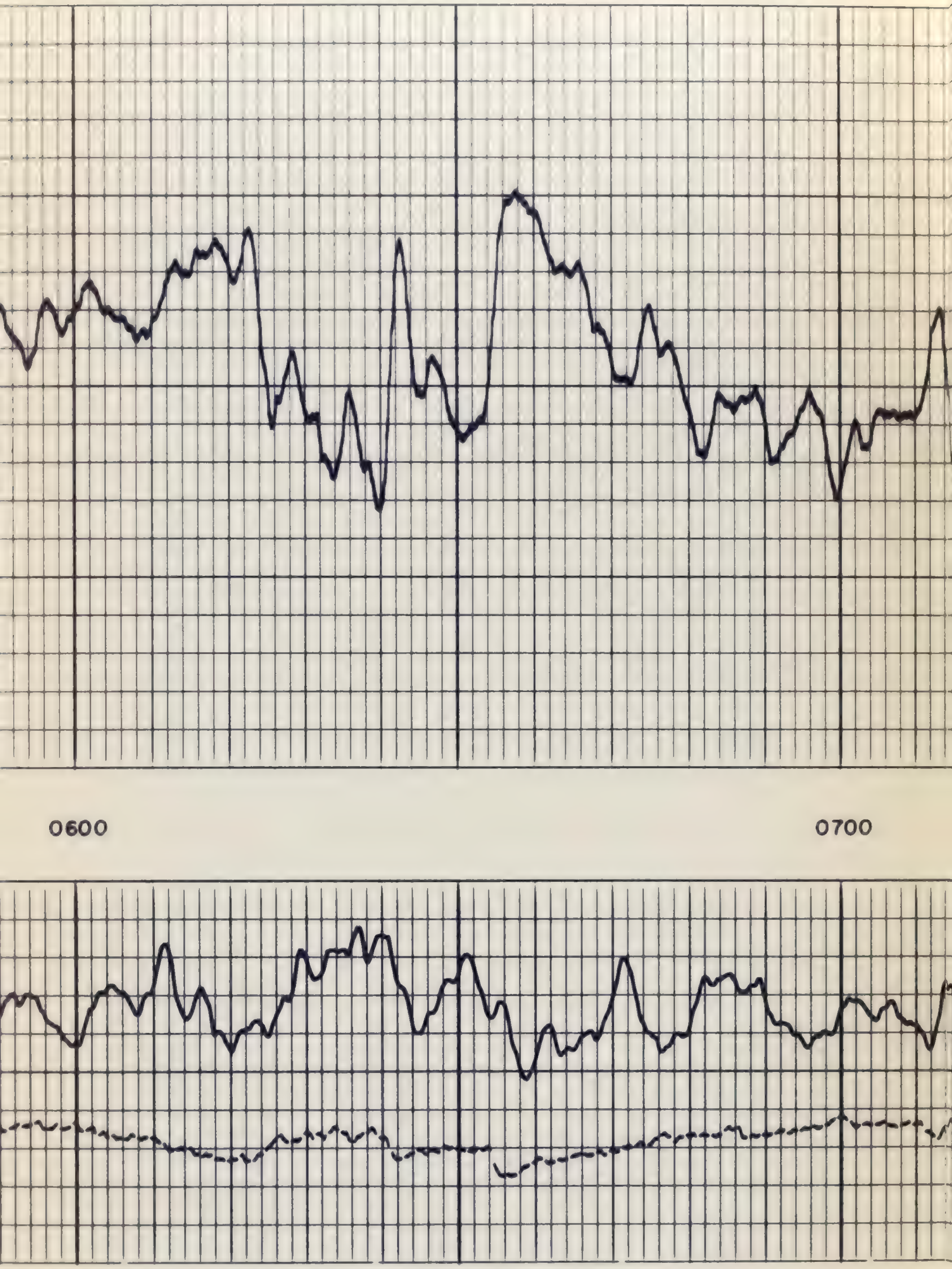

Caliper
GR
2600
2700
ΔT
DETAIL LOG
5″=100′
GAMMA RAY
API UNITS
DEPTHS
INTERVAL TRANSIT TIME
MICROSECONDS PER FOOT
T 3 R₁ 2 R₂


150
300
CALIPER
HOLE DIAM. IN INCHES
6
16
250
200
150
0400


FLUID LEVEL
ΔT
0500
Caliper
GR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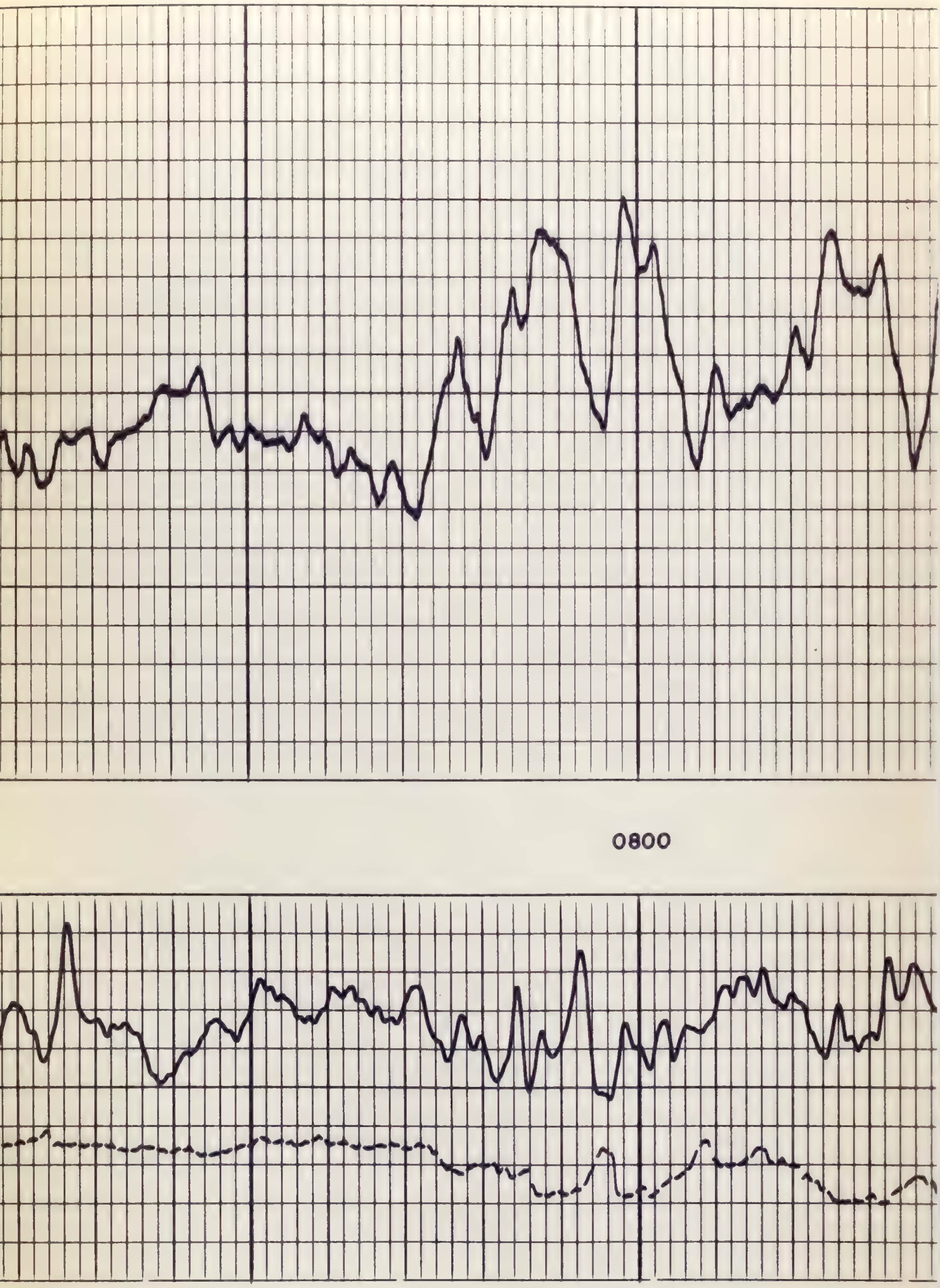
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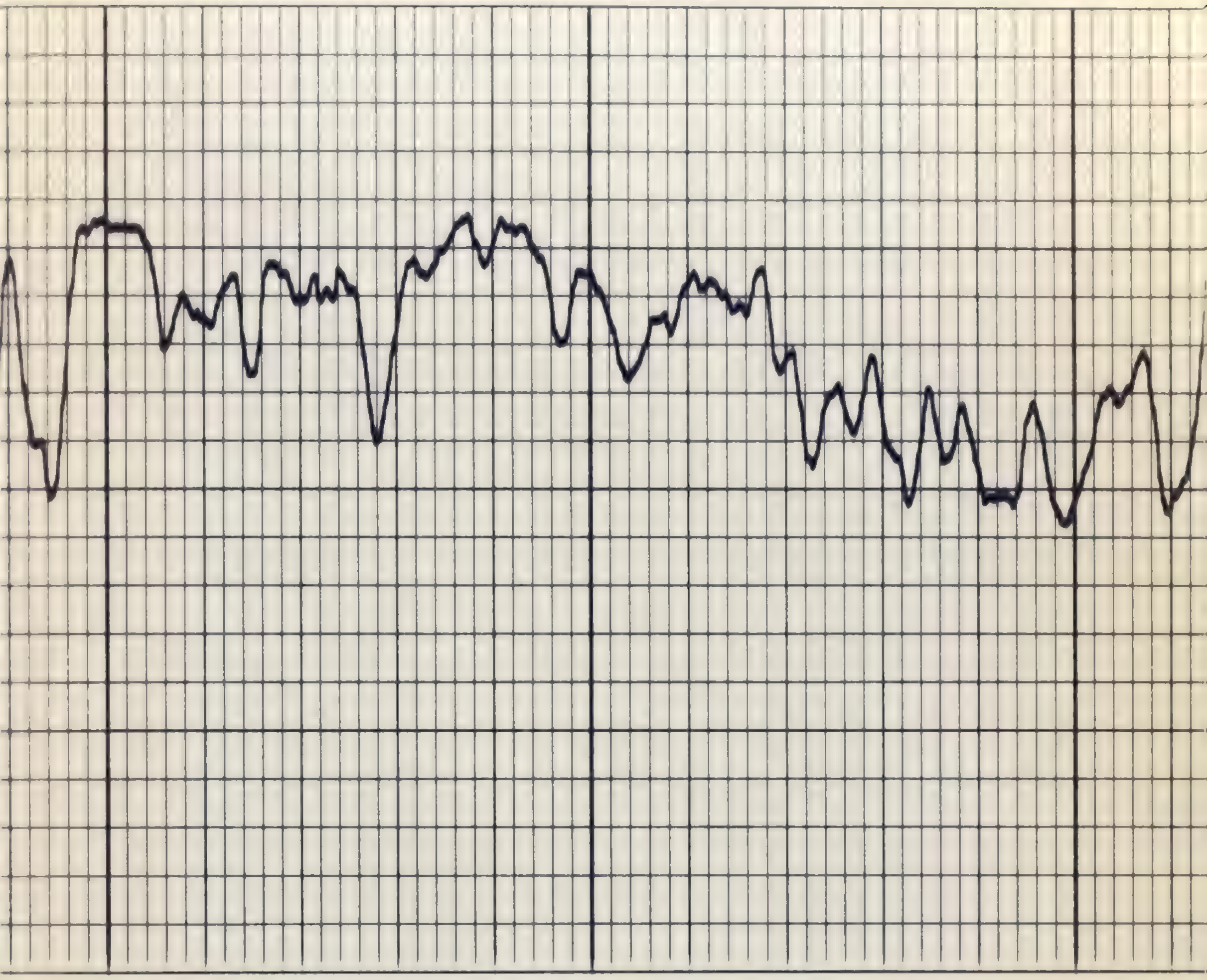

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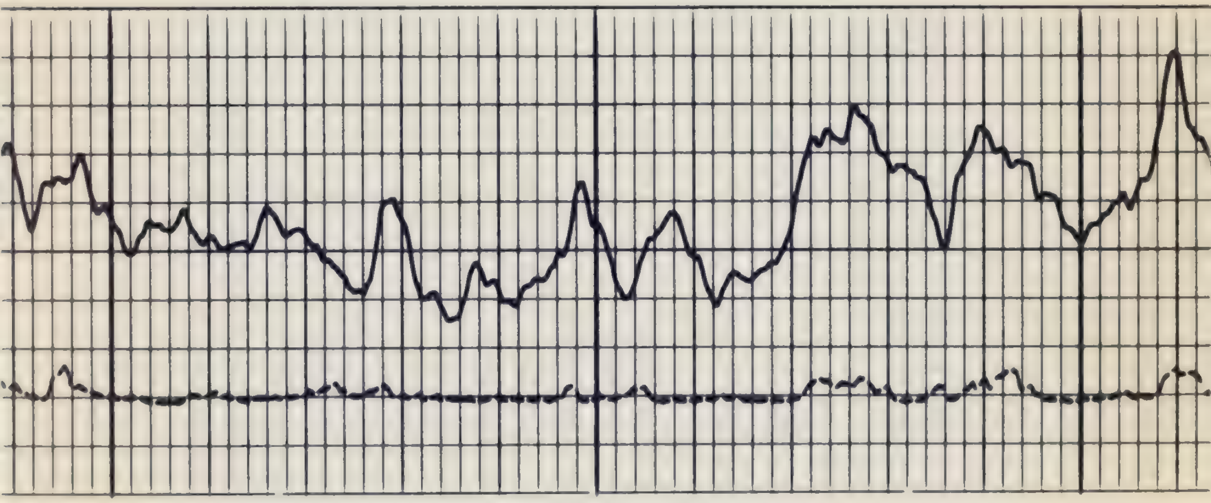

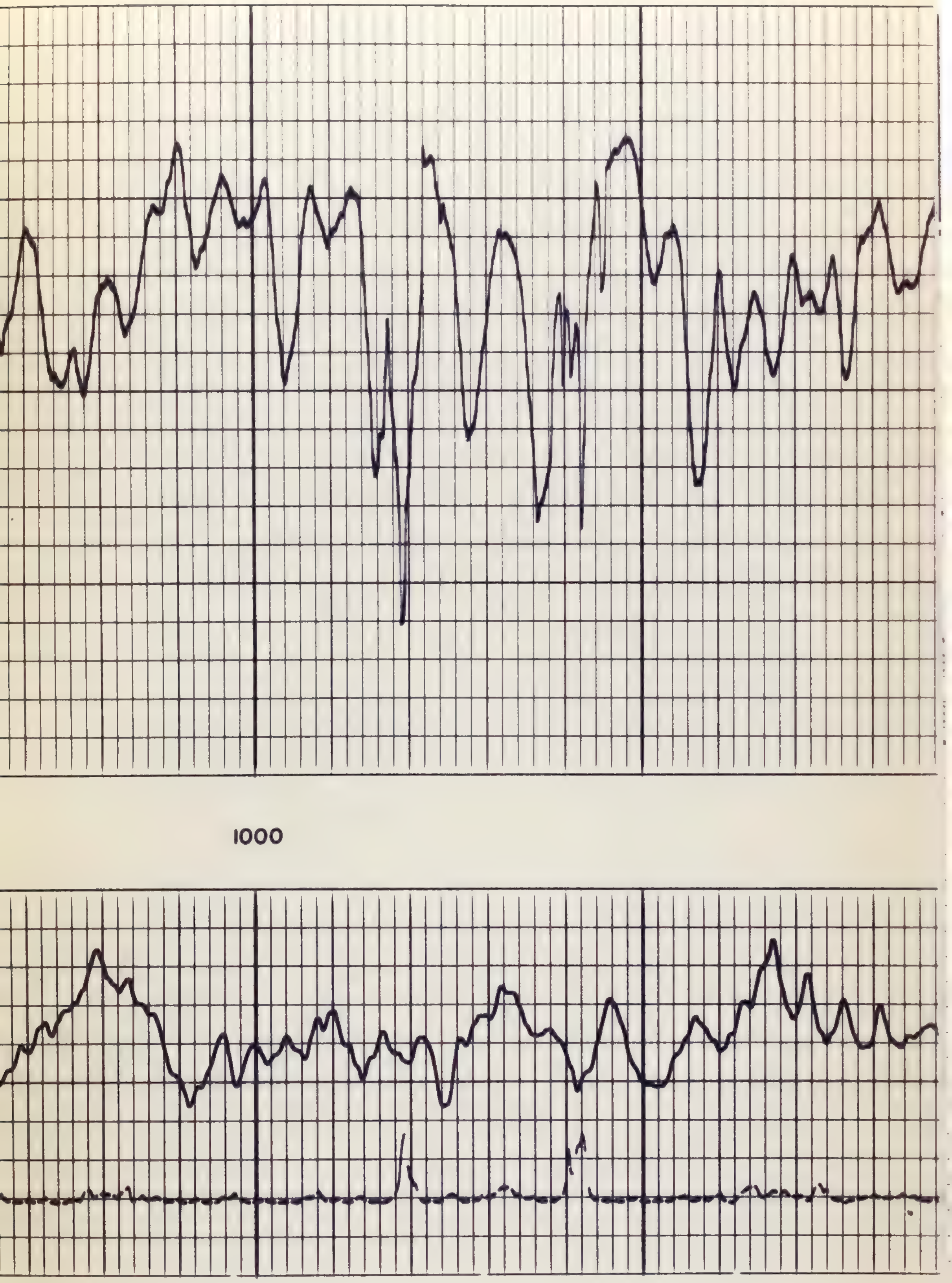
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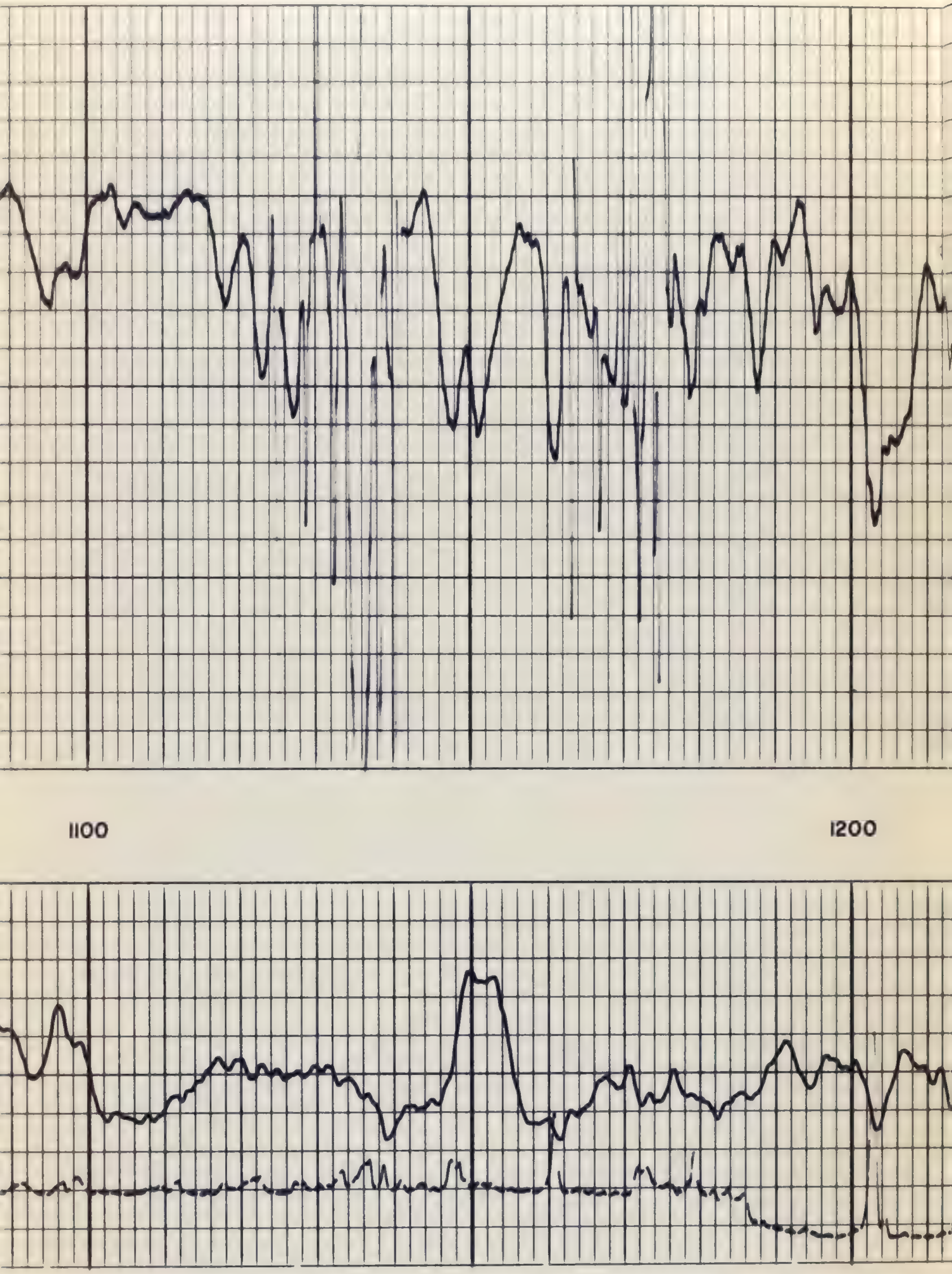
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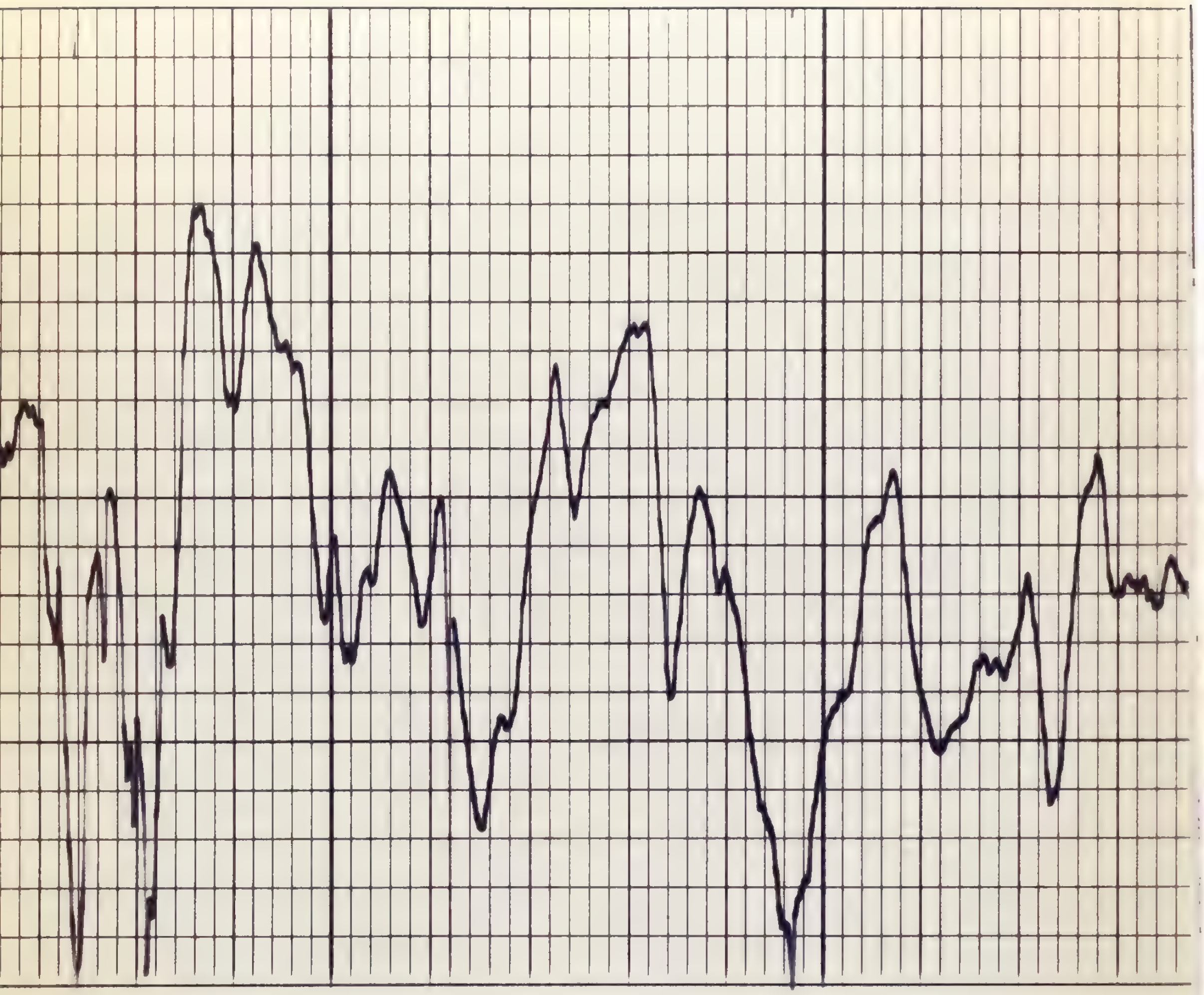

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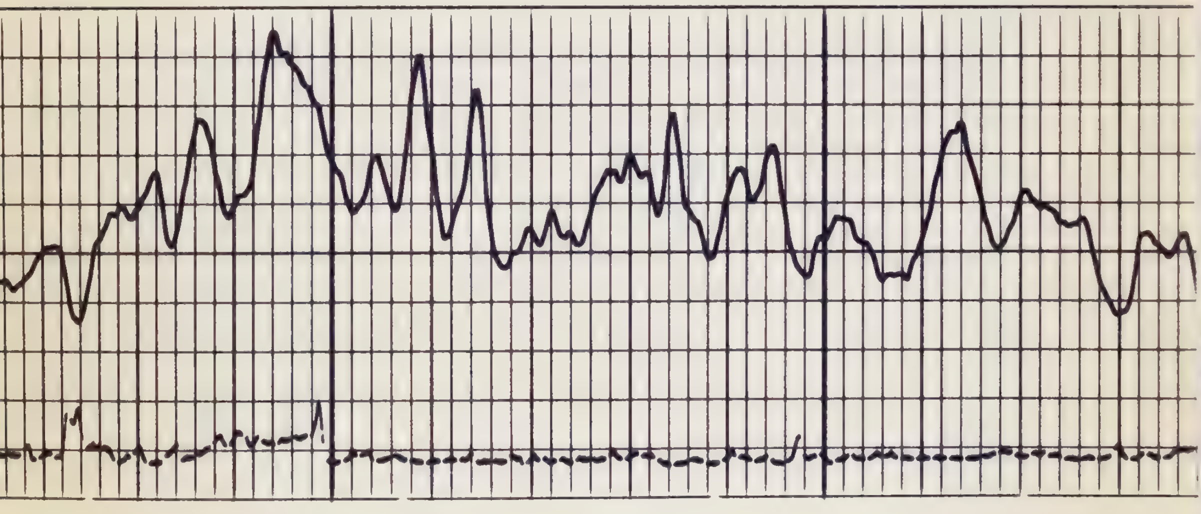

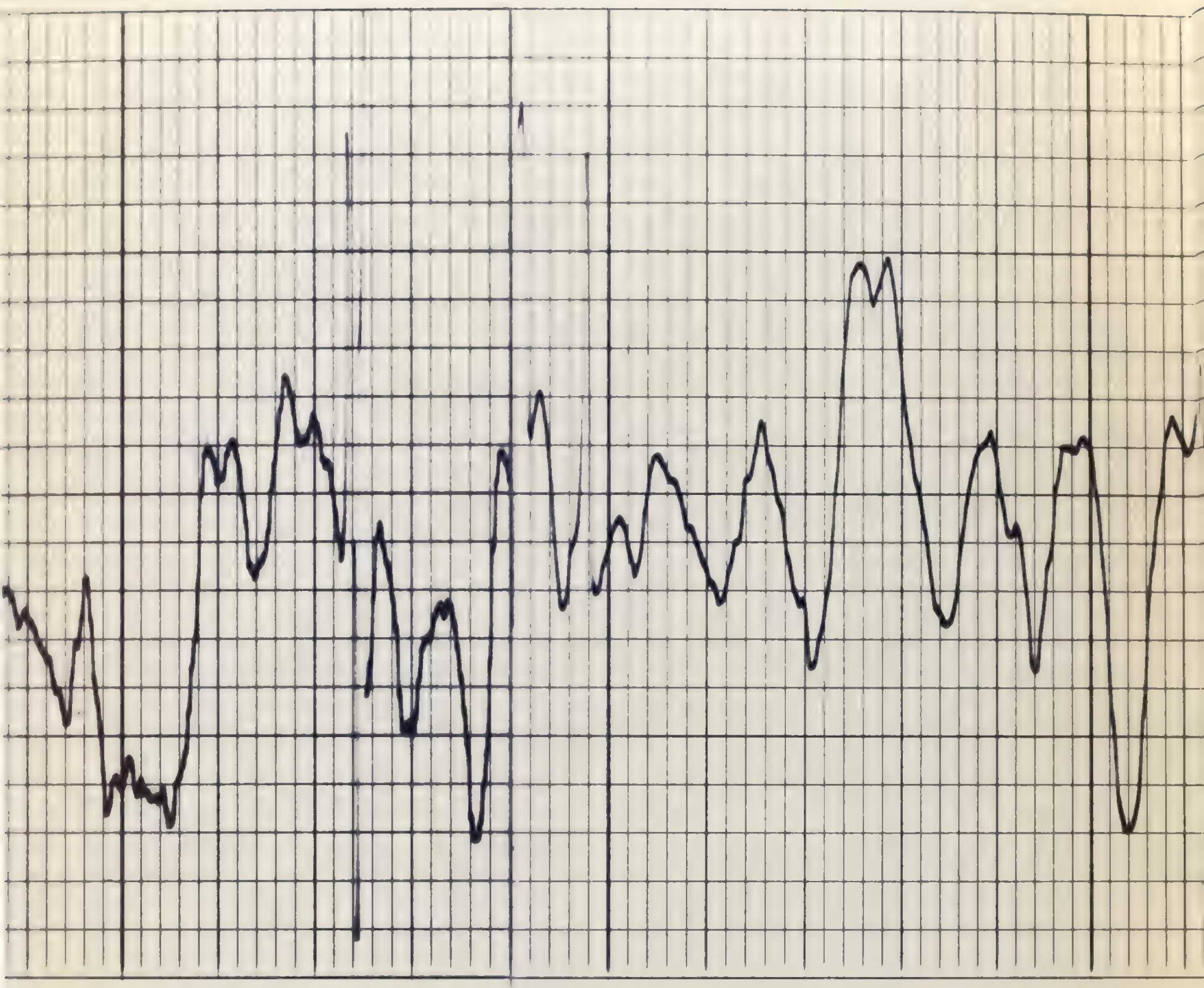

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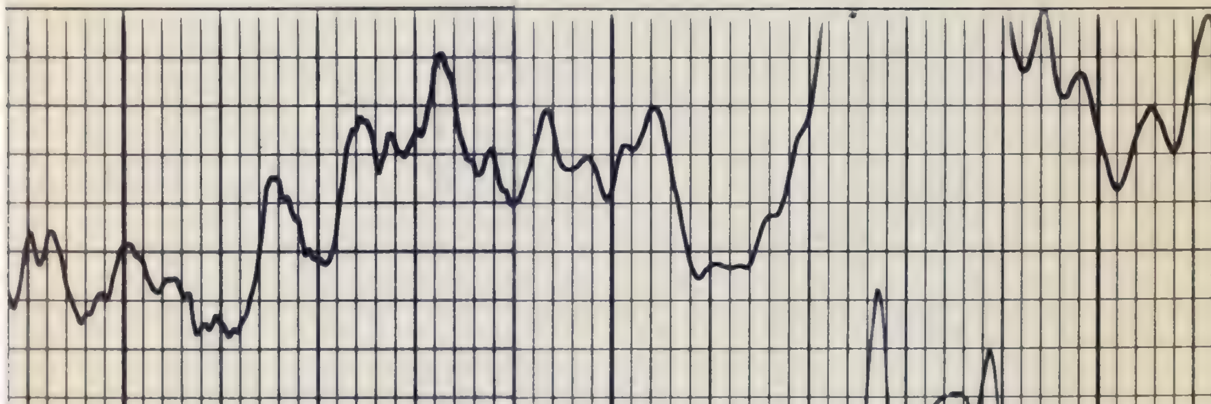

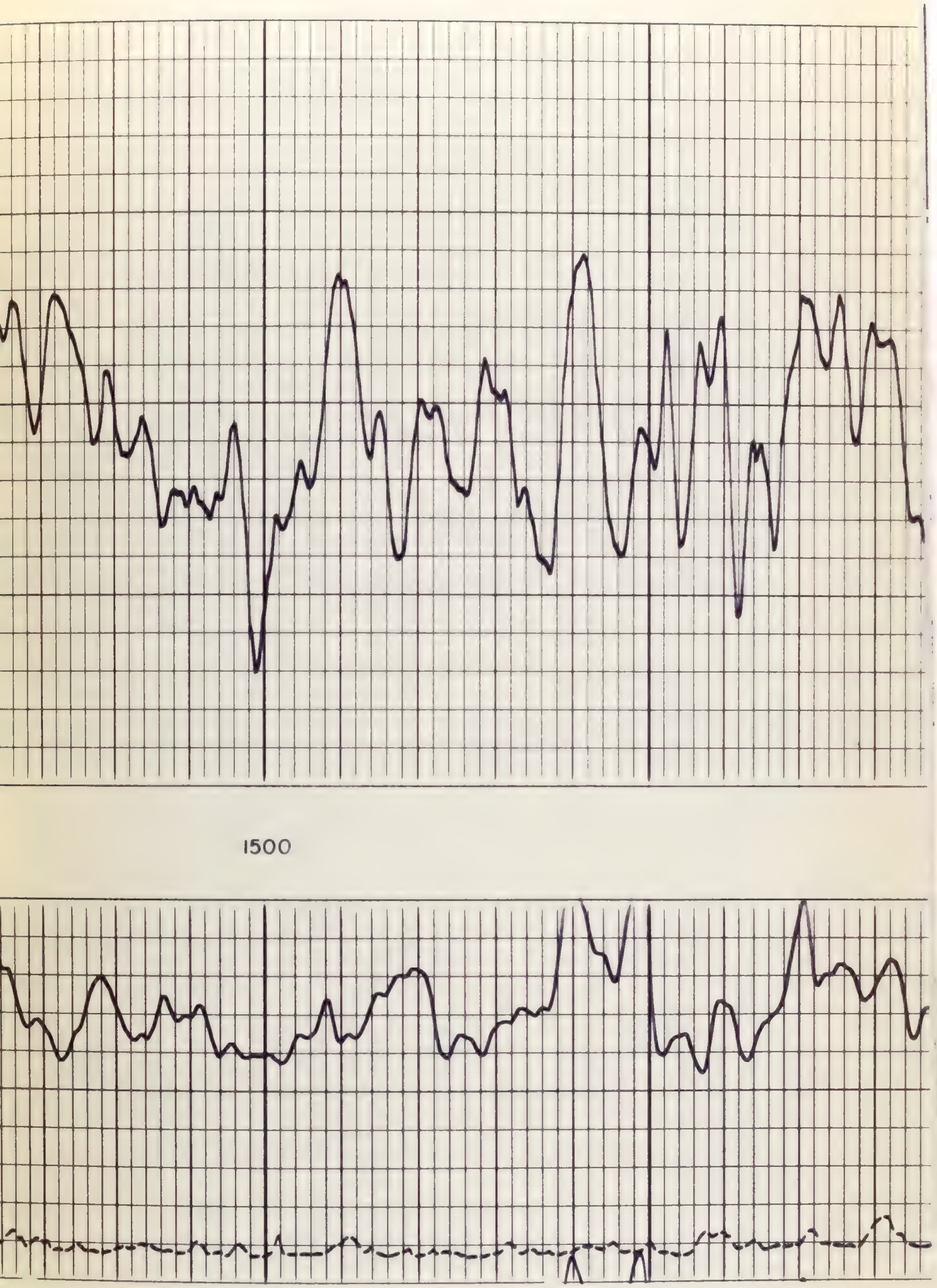
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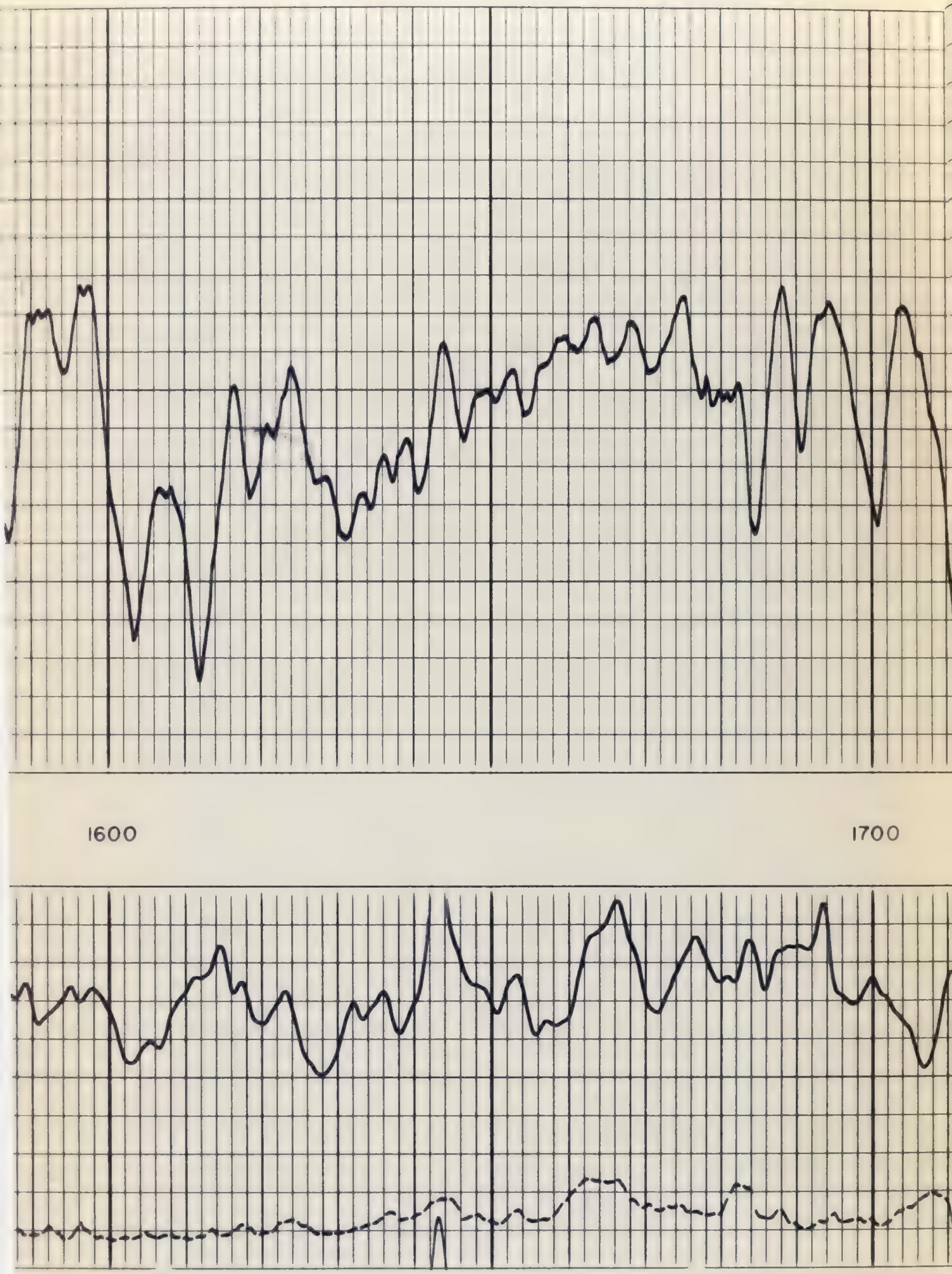
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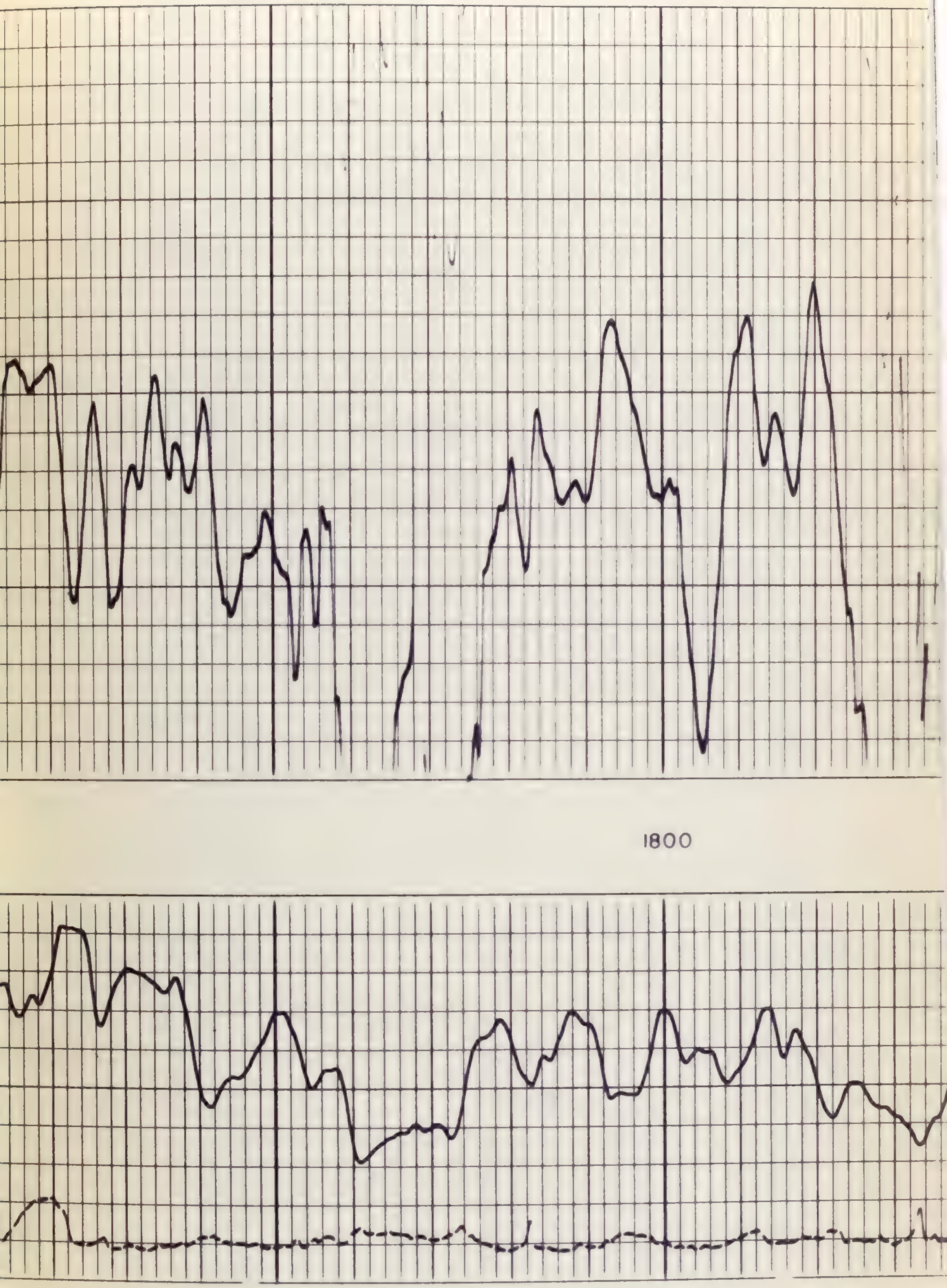
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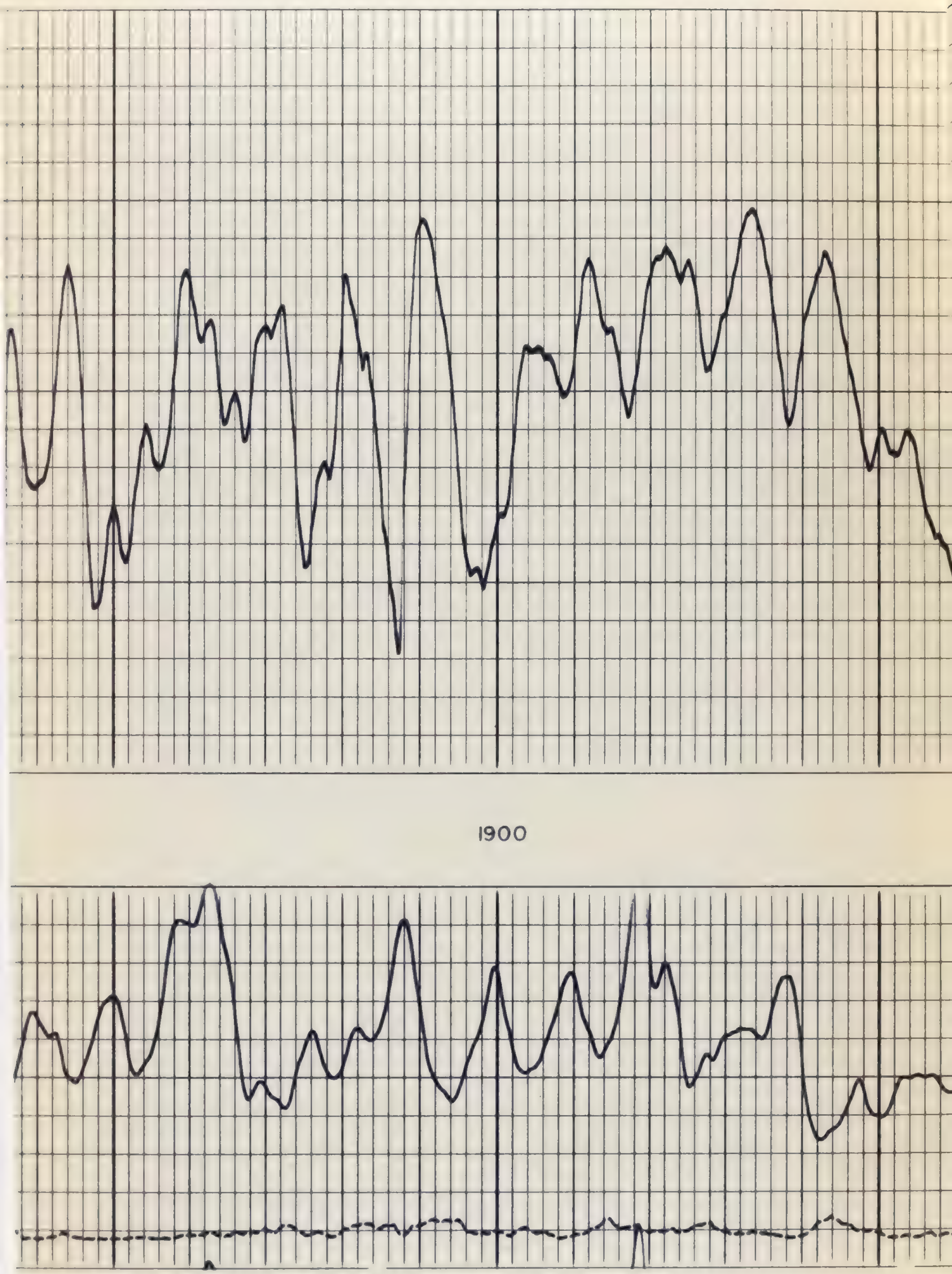
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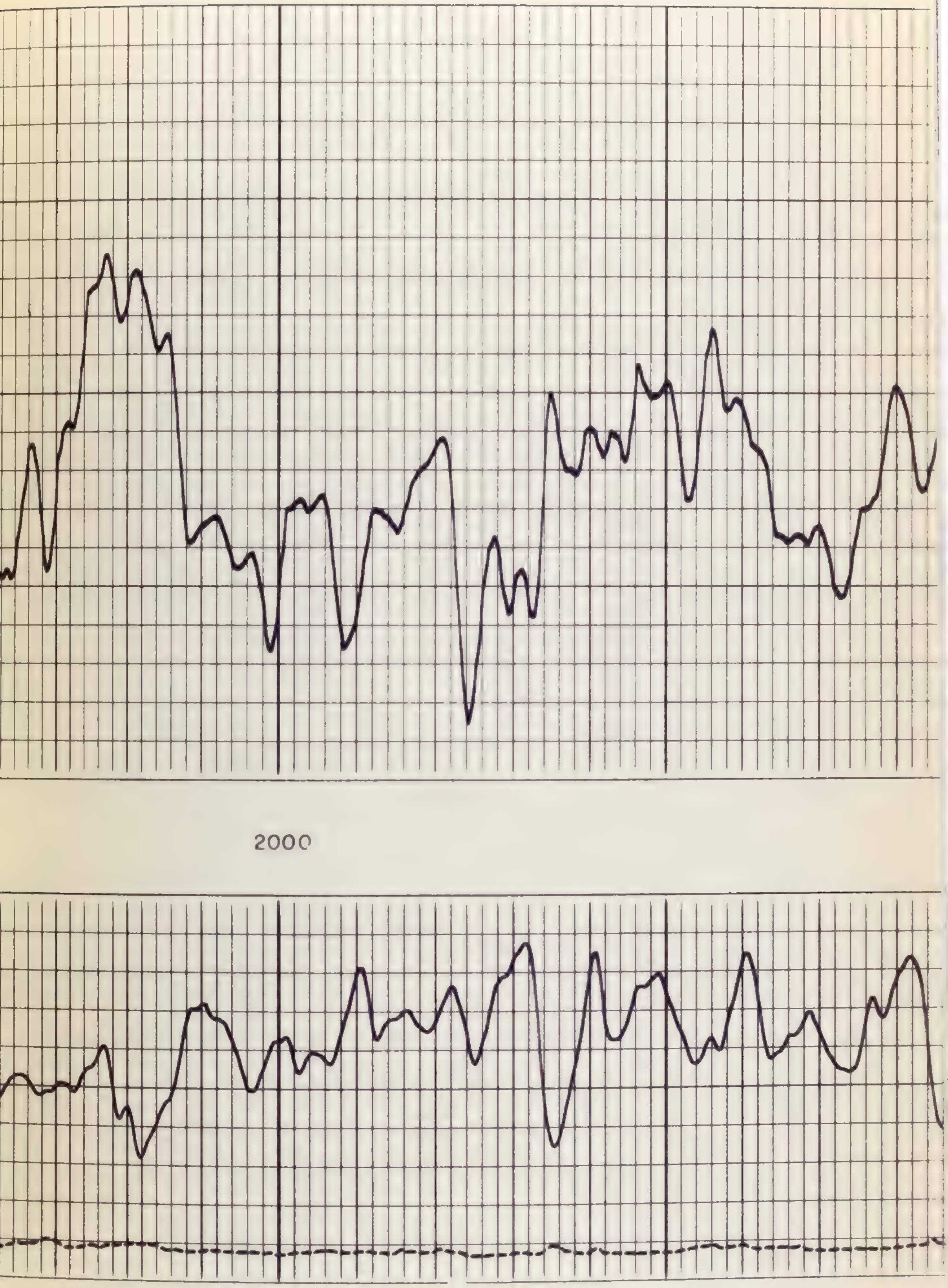
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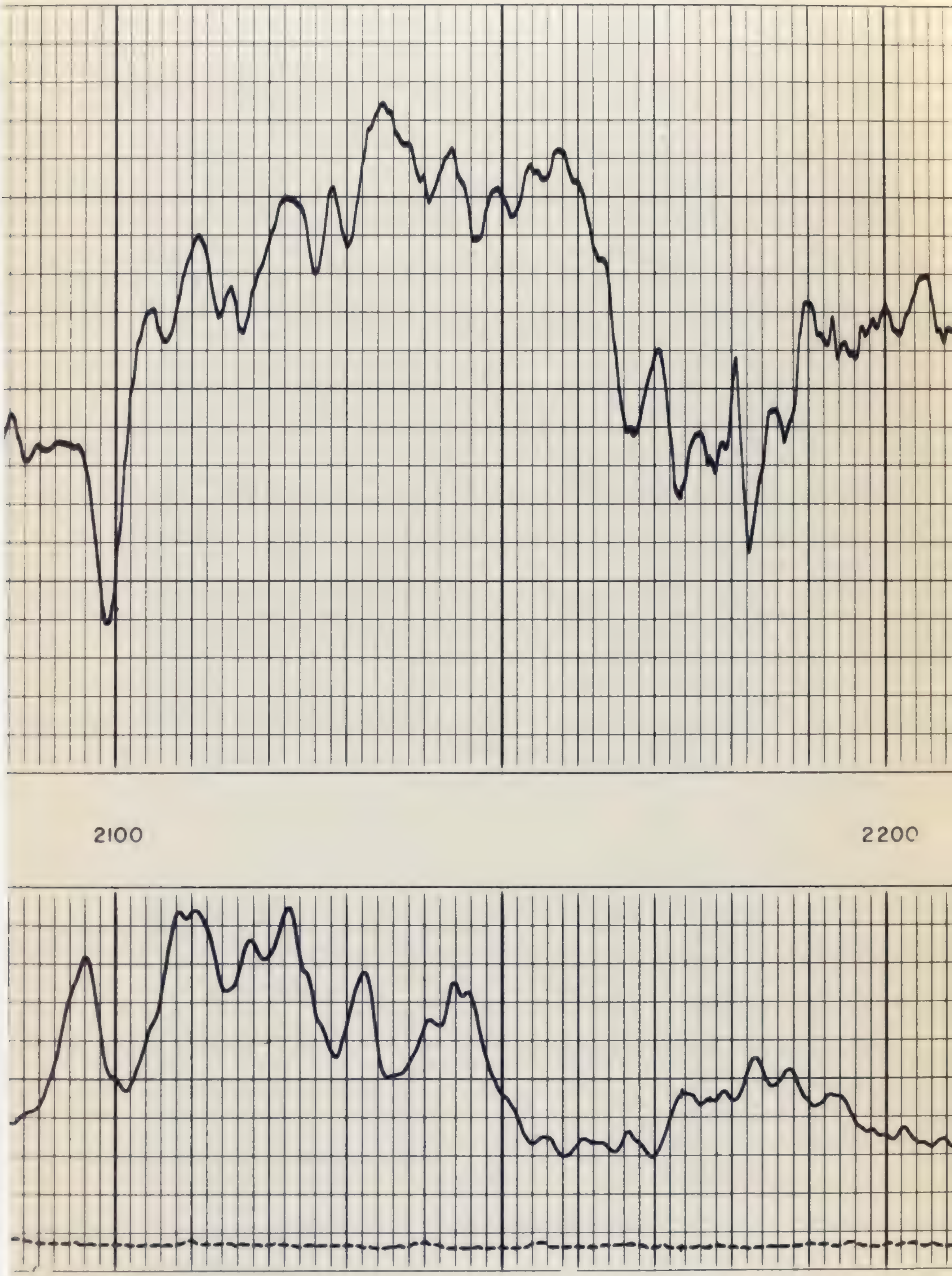
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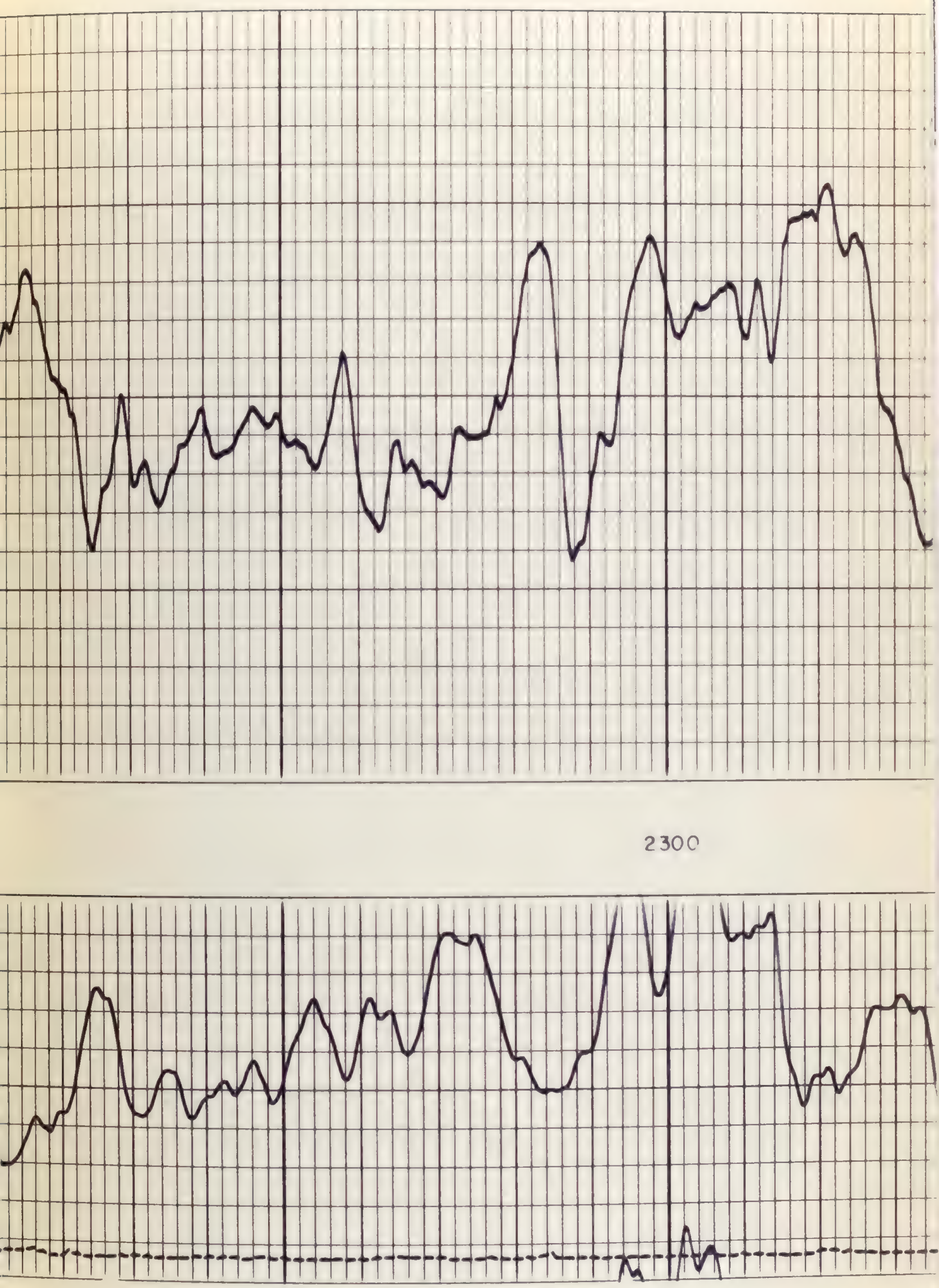
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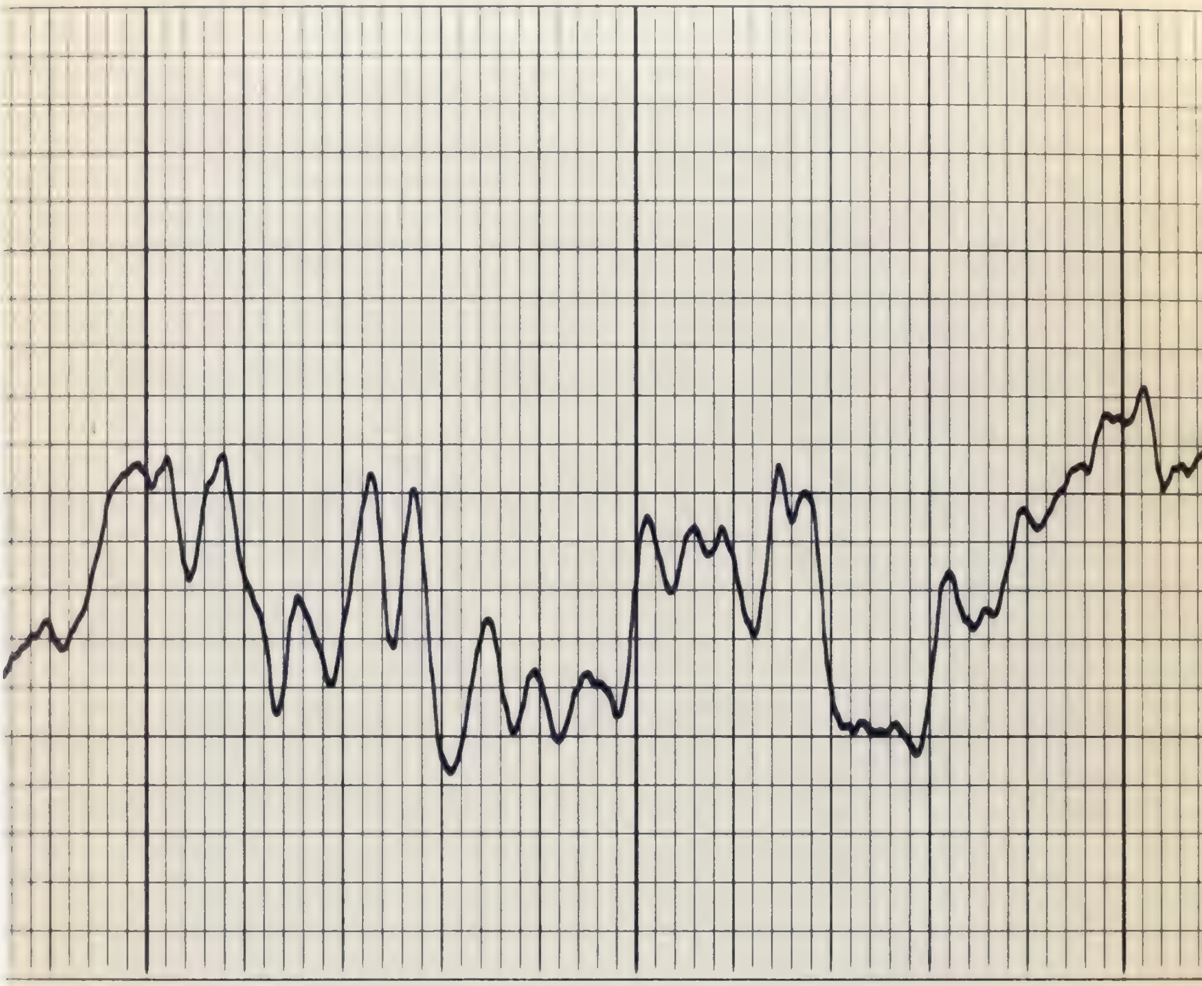

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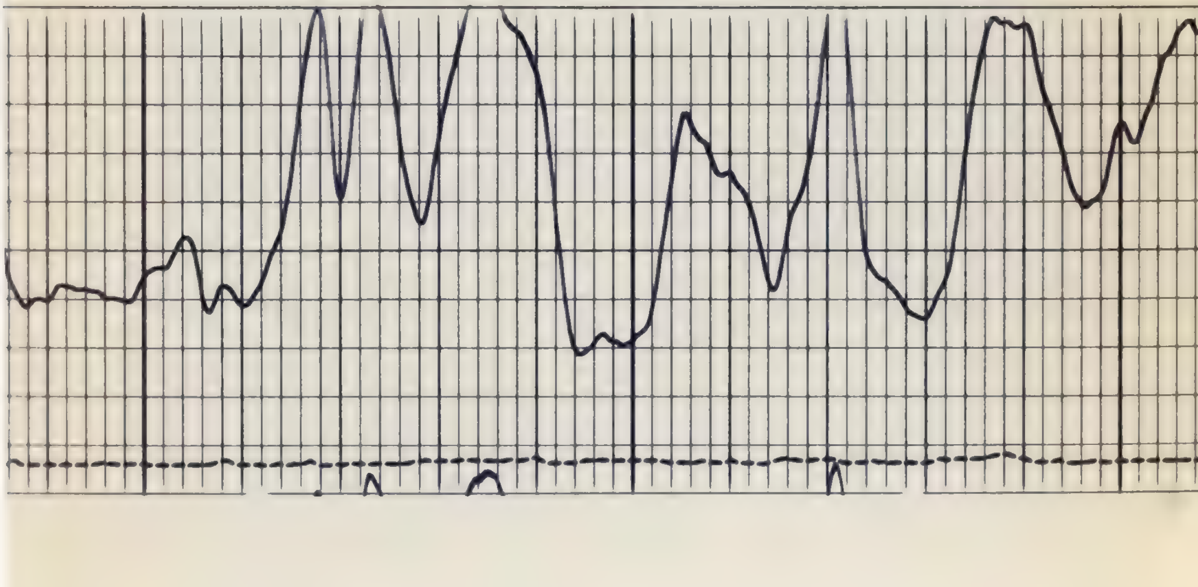

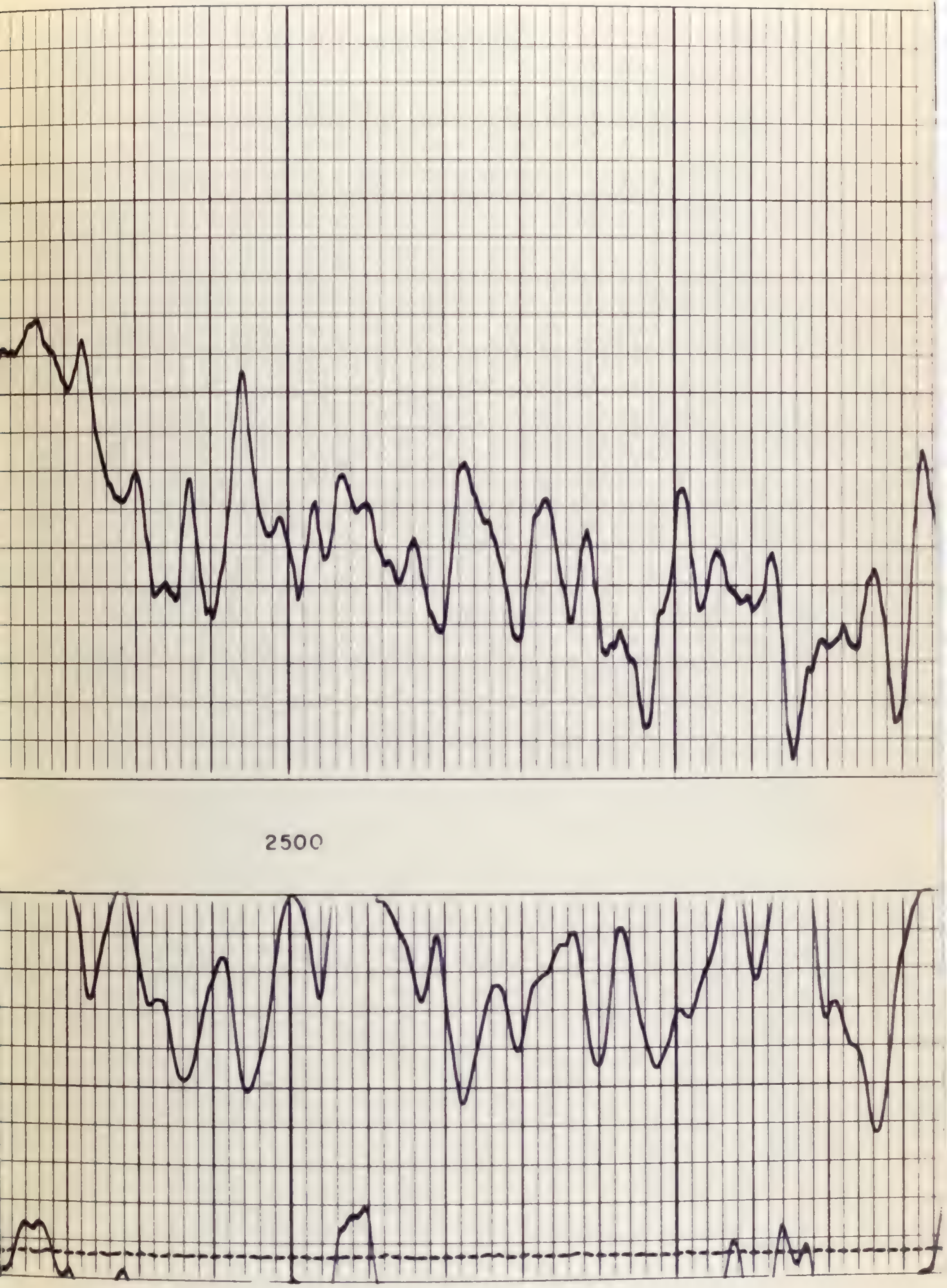
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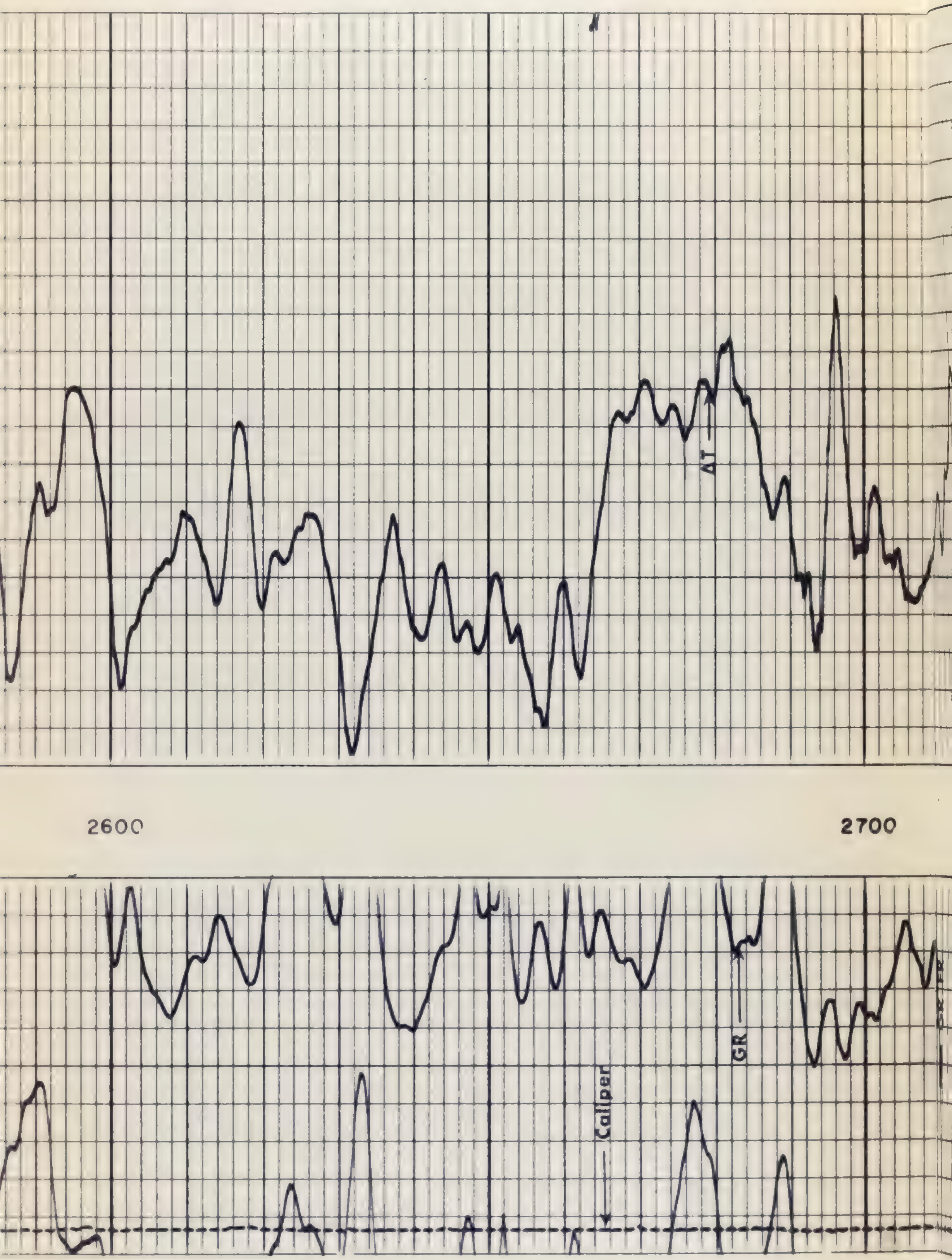
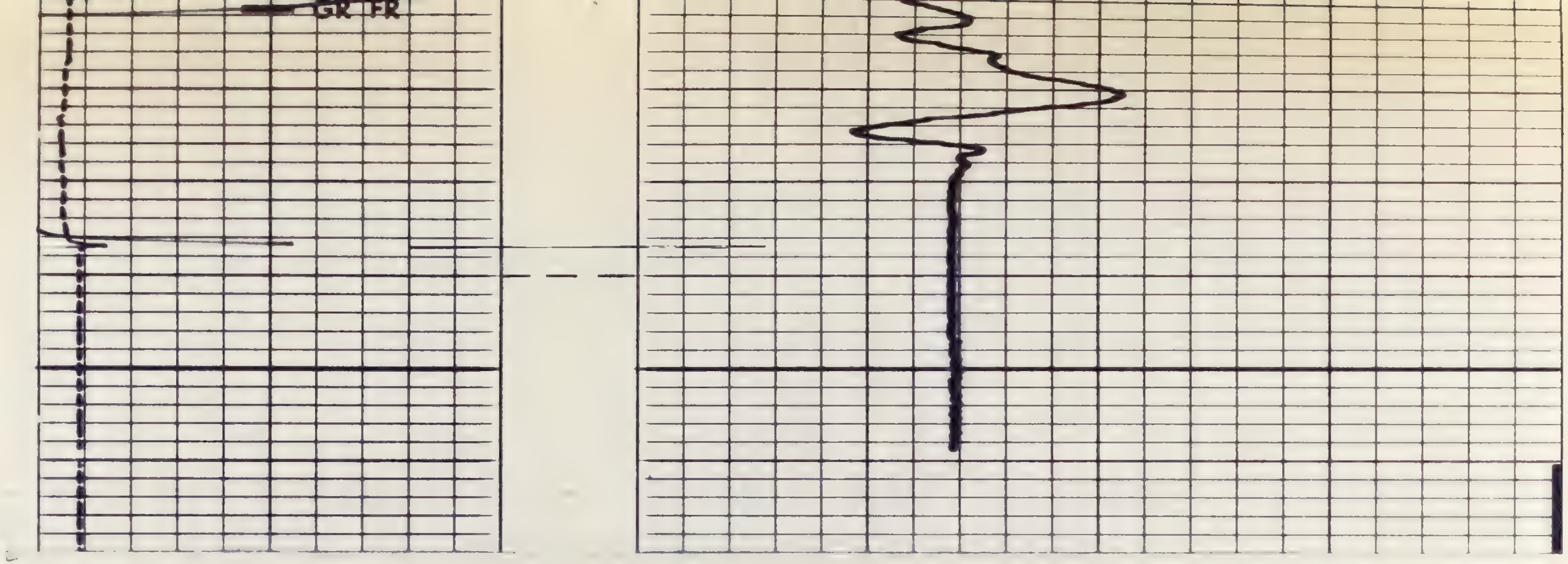

ΔT
2600
2700
GR
Caliper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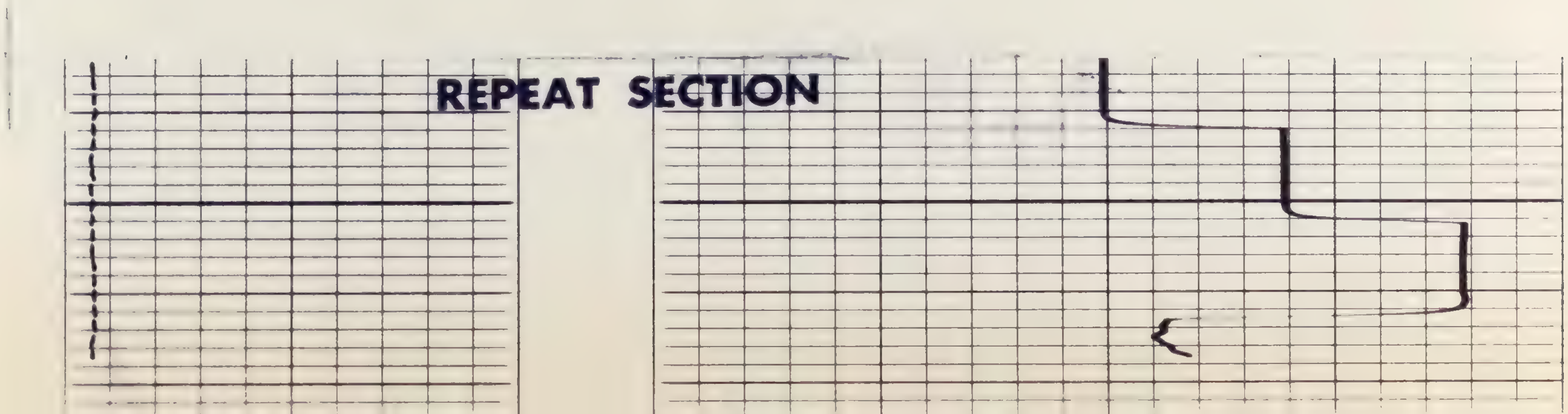
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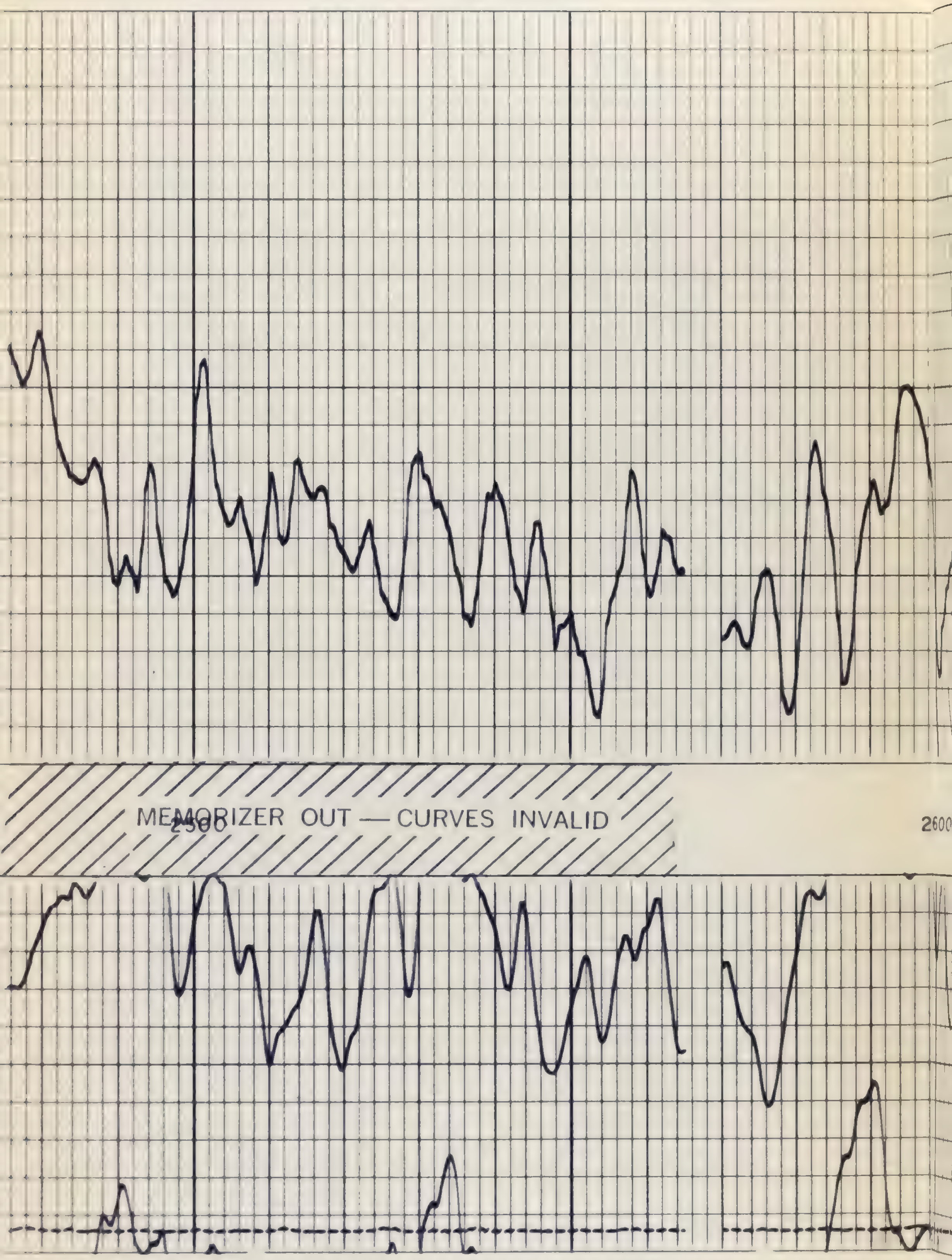
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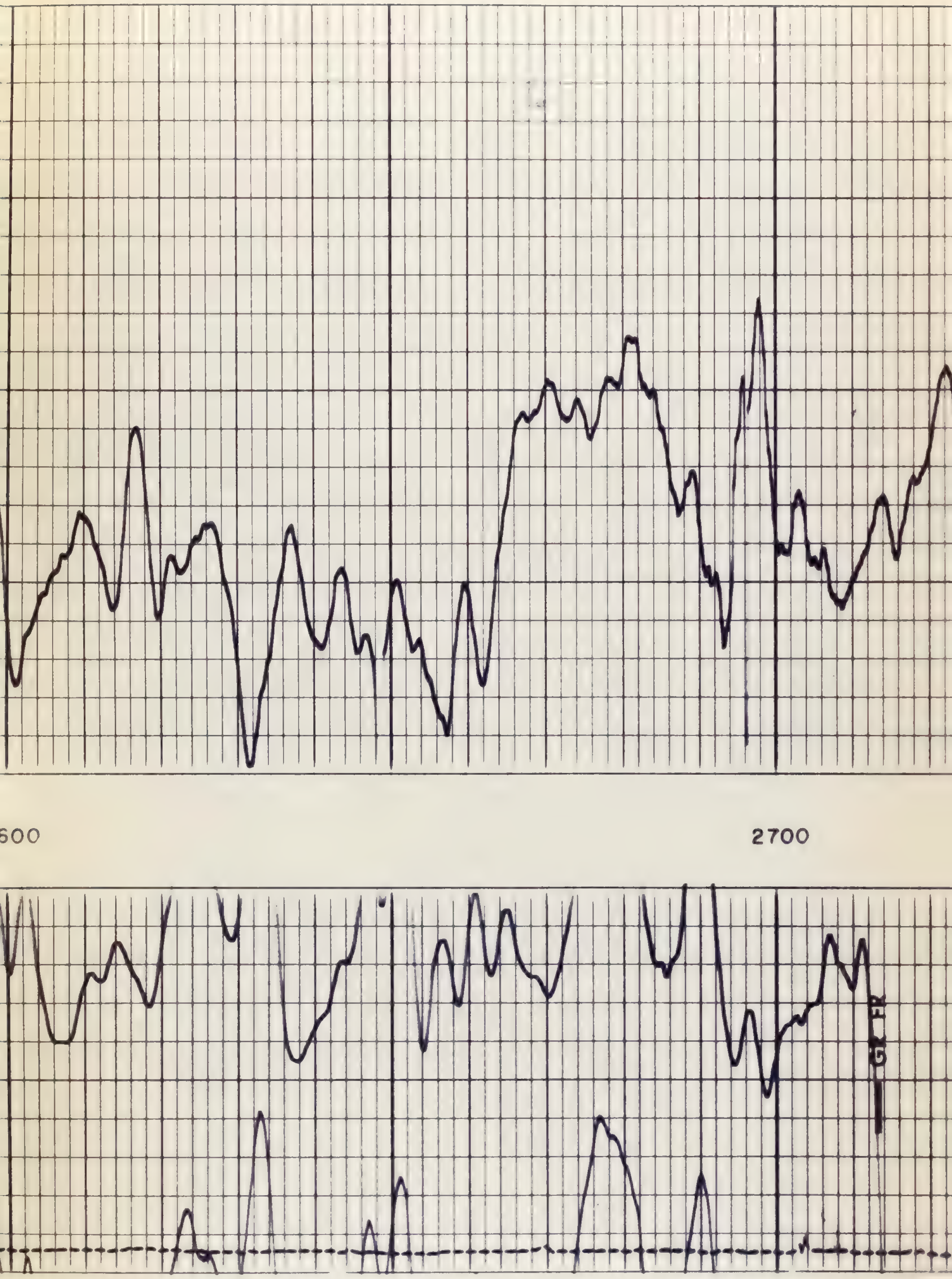
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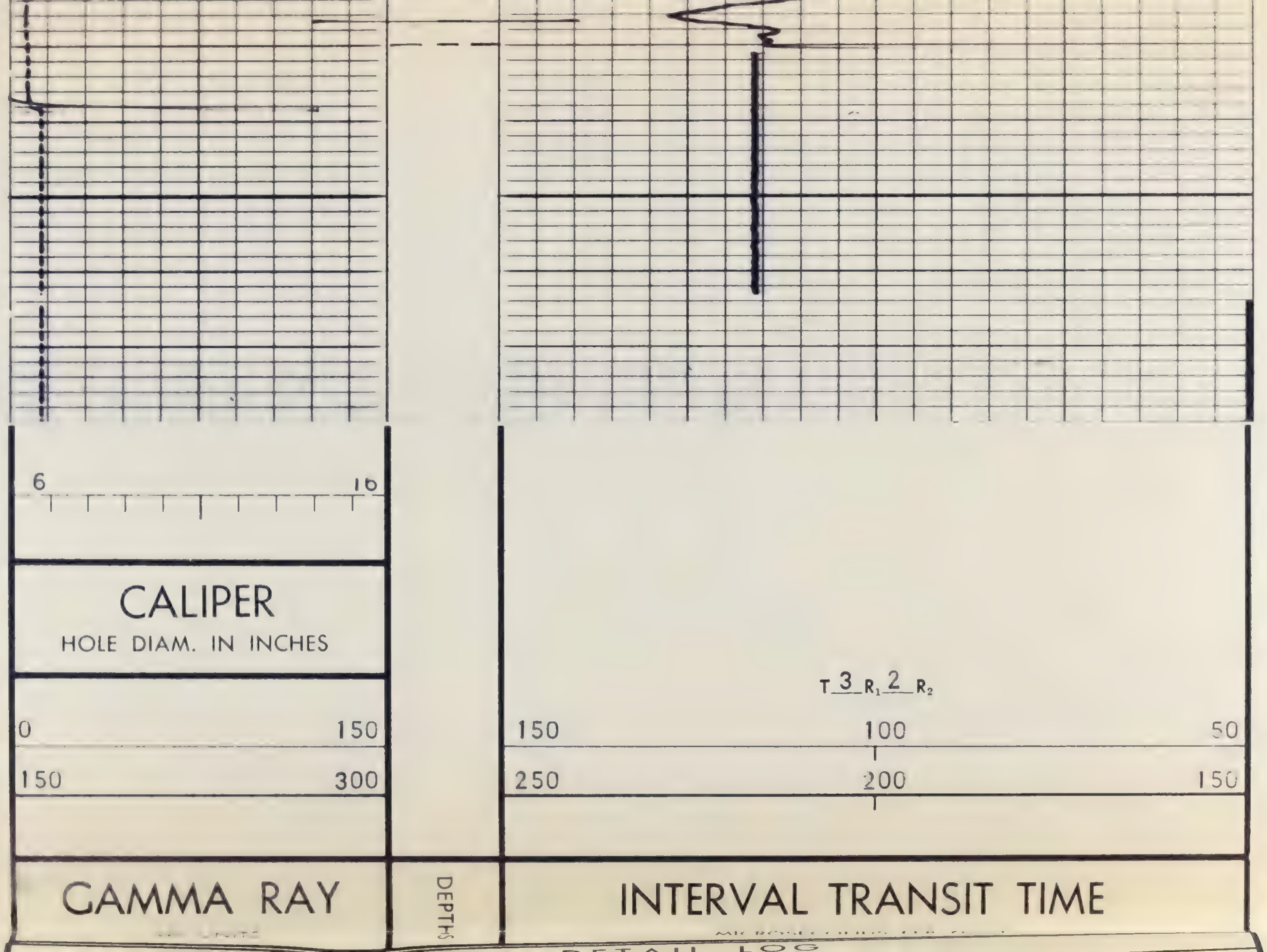
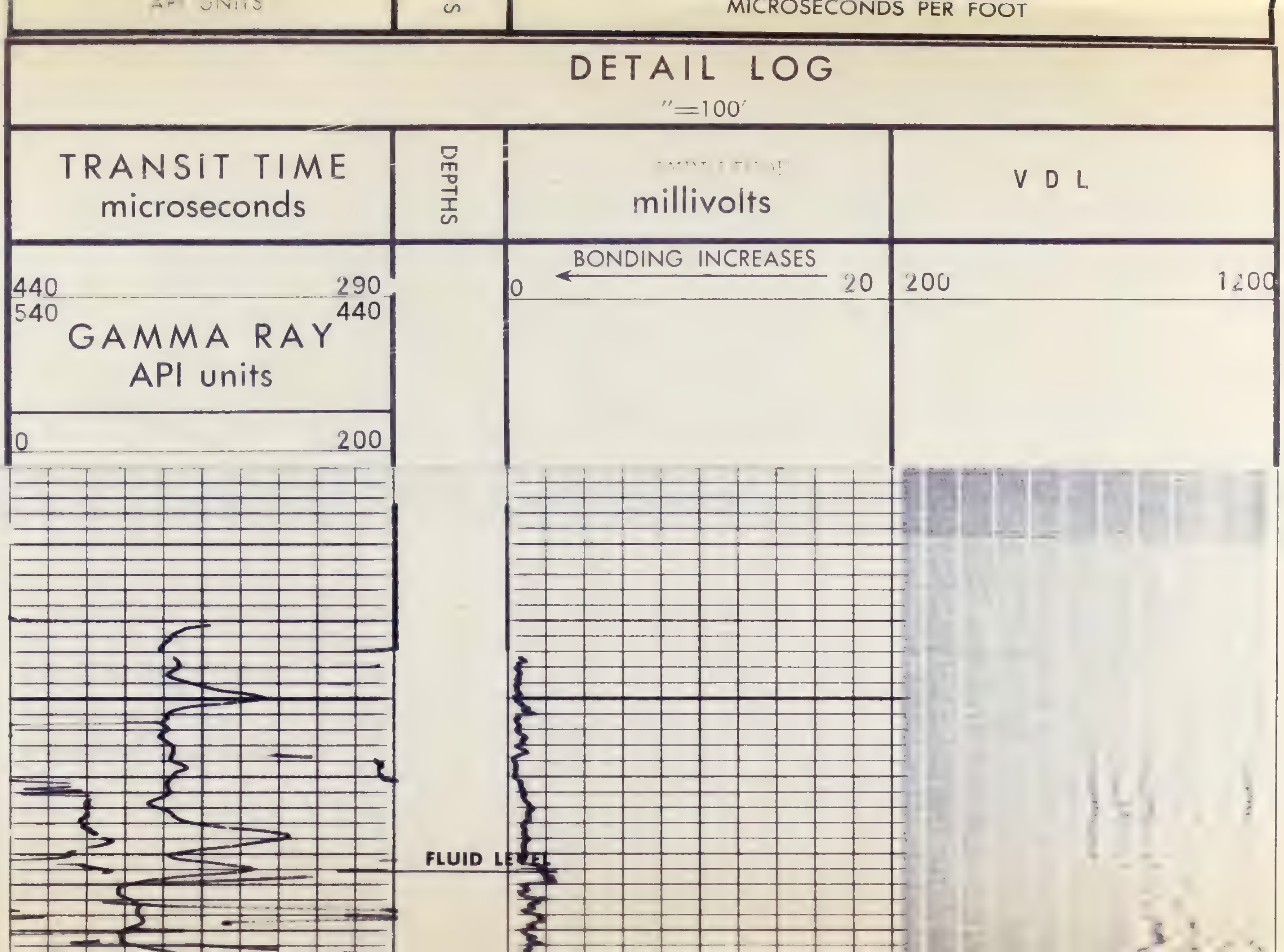
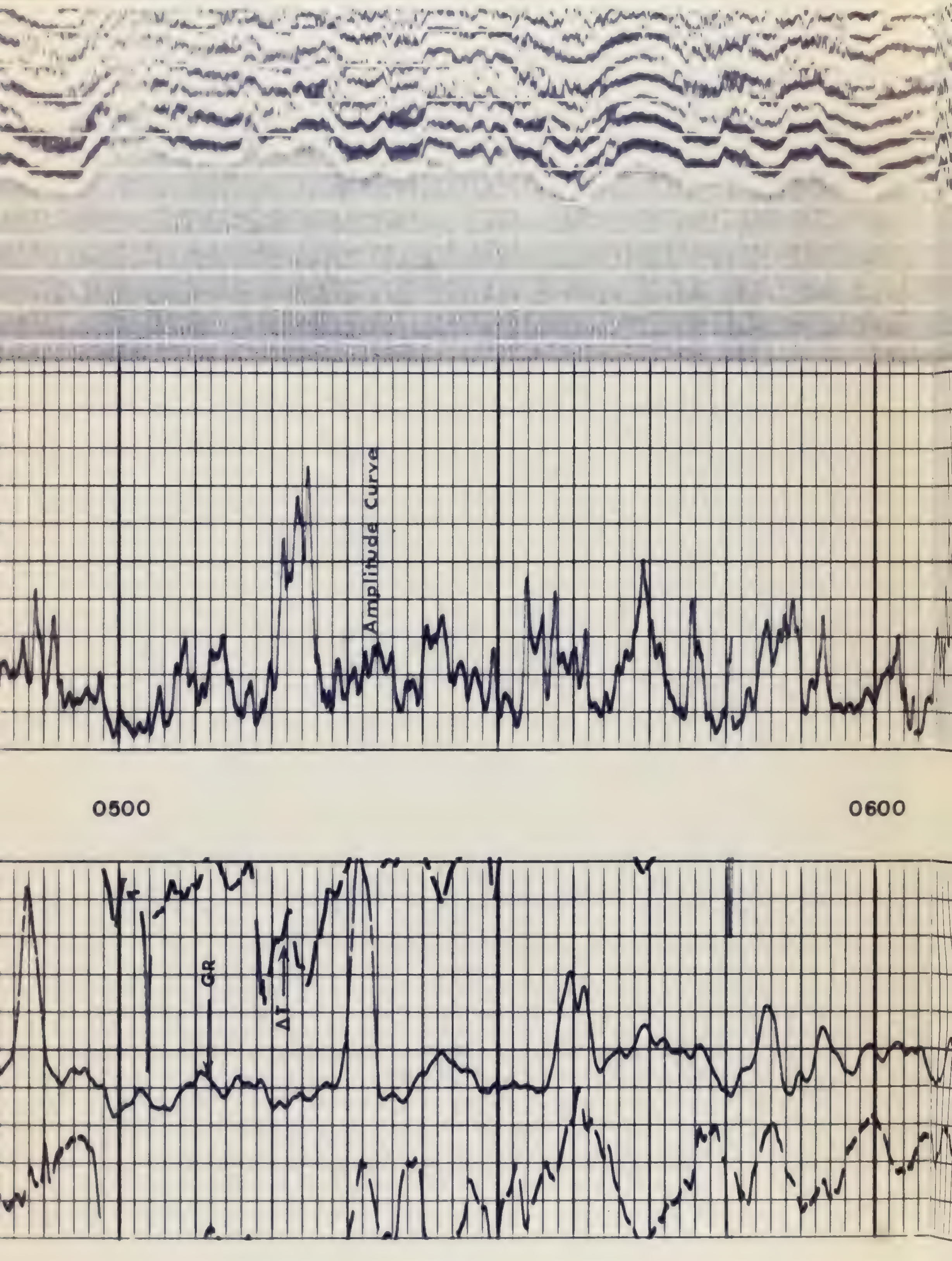
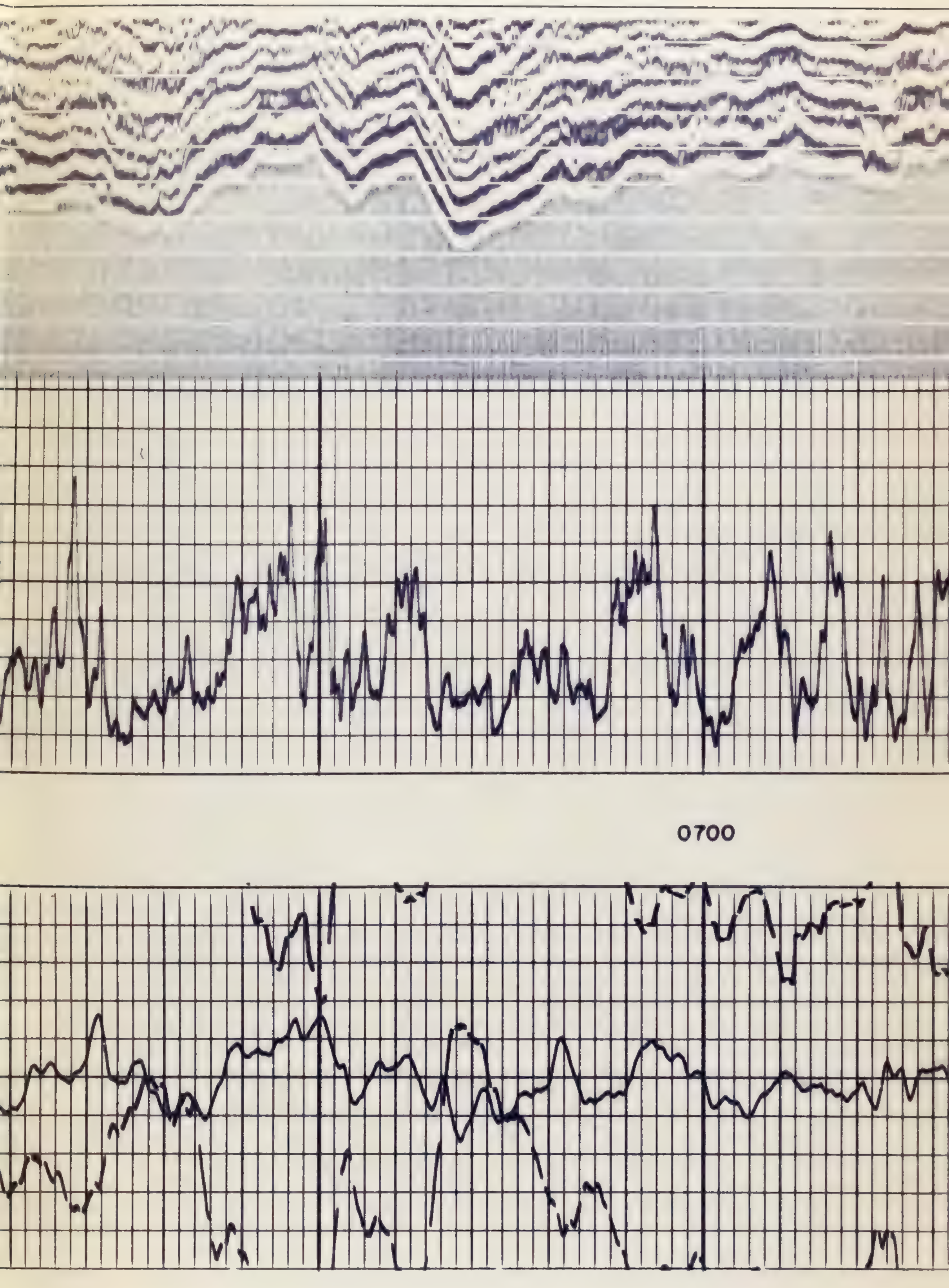

6
16
CALIPER
HOLE DIAM. IN INCHES
0
150
150
300
GAMMA RAY
DEPTHS
T 3 R₁ 2 R₂
150
100
50
250
200
150
INTERVAL TRANSIT TIME


API UNITS
S
MICROSECONDS PER FOOT
DETAIL LOG
"=100'
TRANSIT TIME
microseconds
440
290
540
440
GAMMA RAY
API units
0
200
DEPTHS
millivolts
BONDING INCREASES
0
20
V D L
200
1200
FLUID LEVEL


Amplitude Curve
0500
0600
GR
ΔT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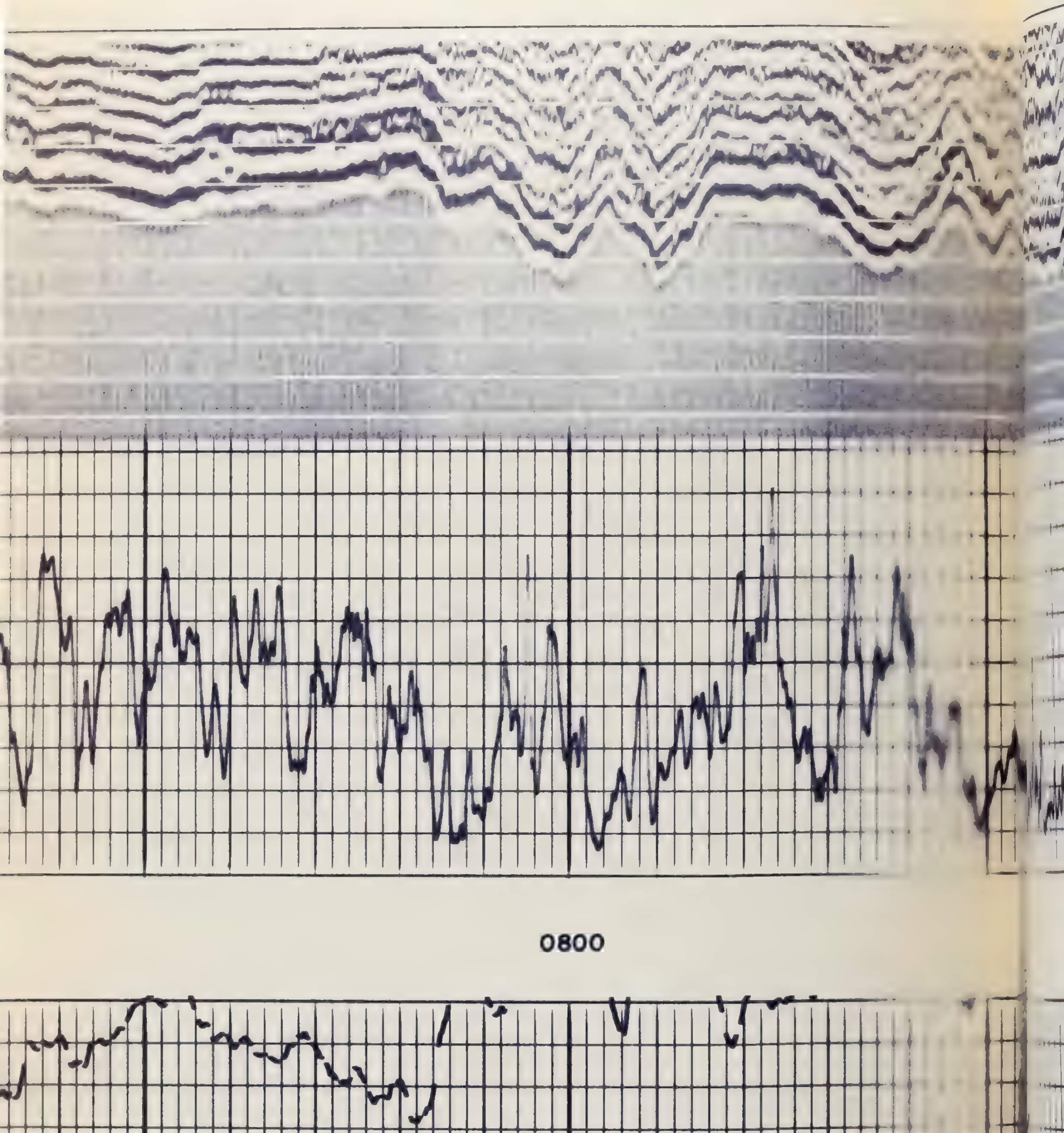
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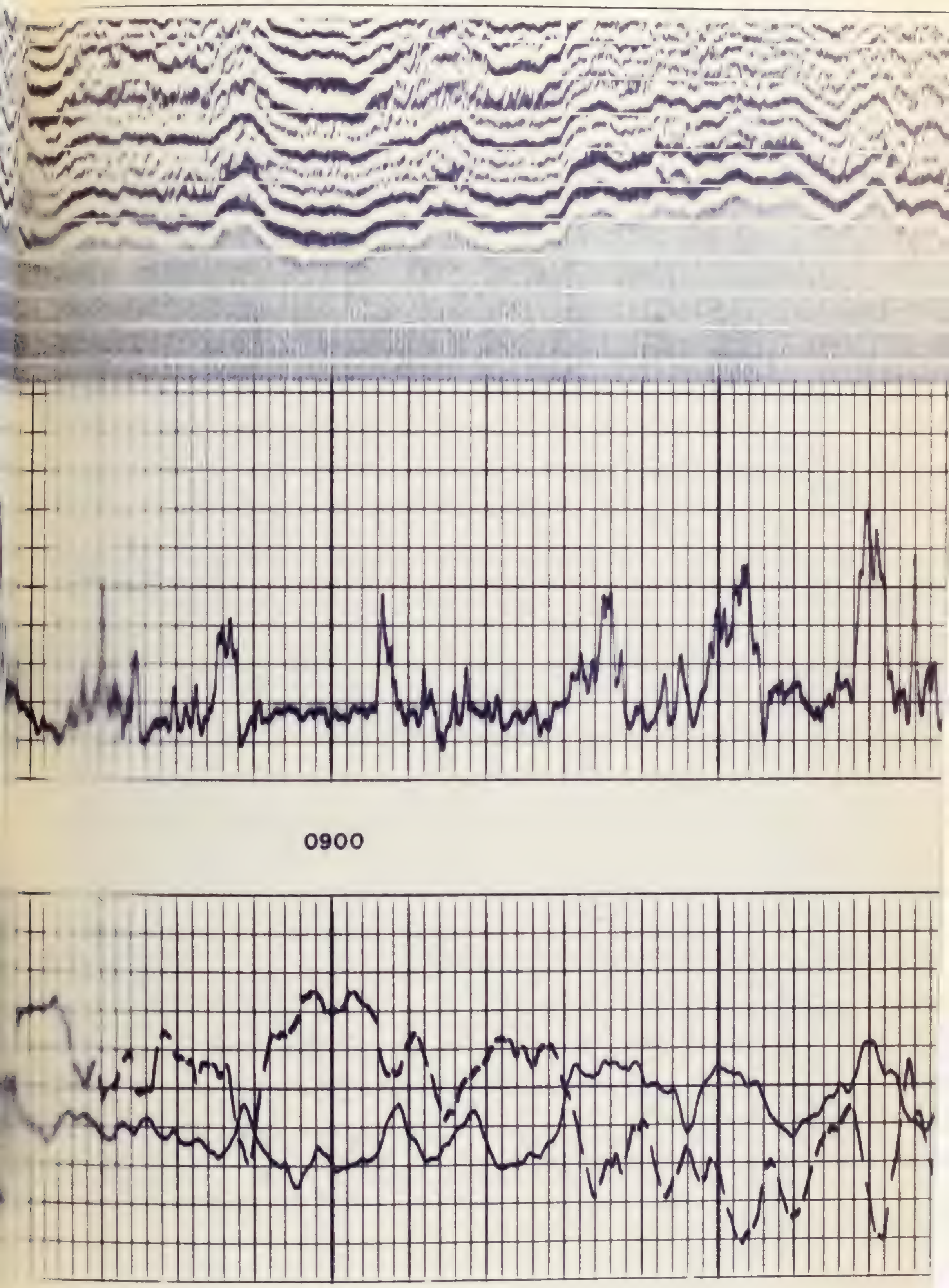
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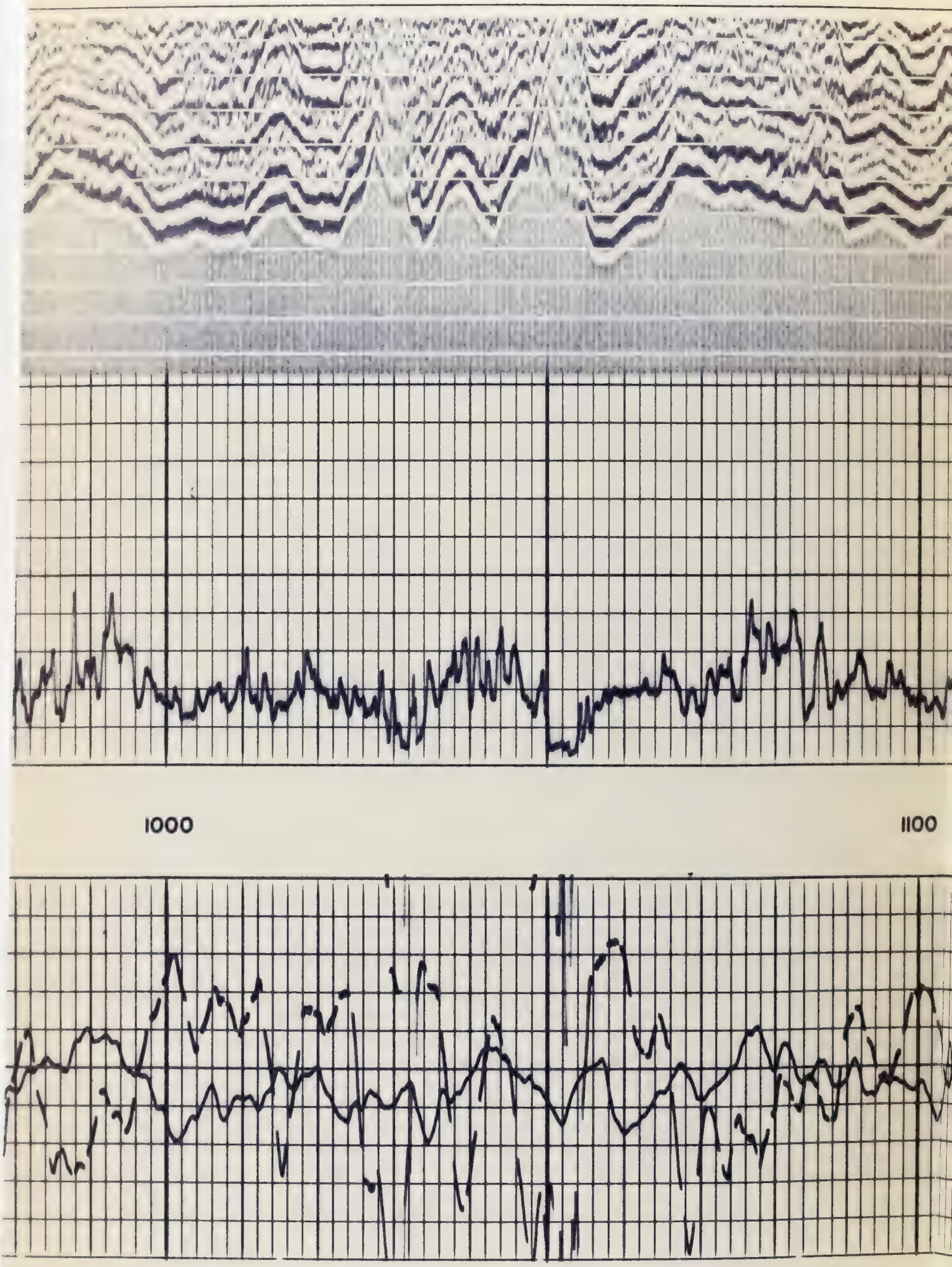
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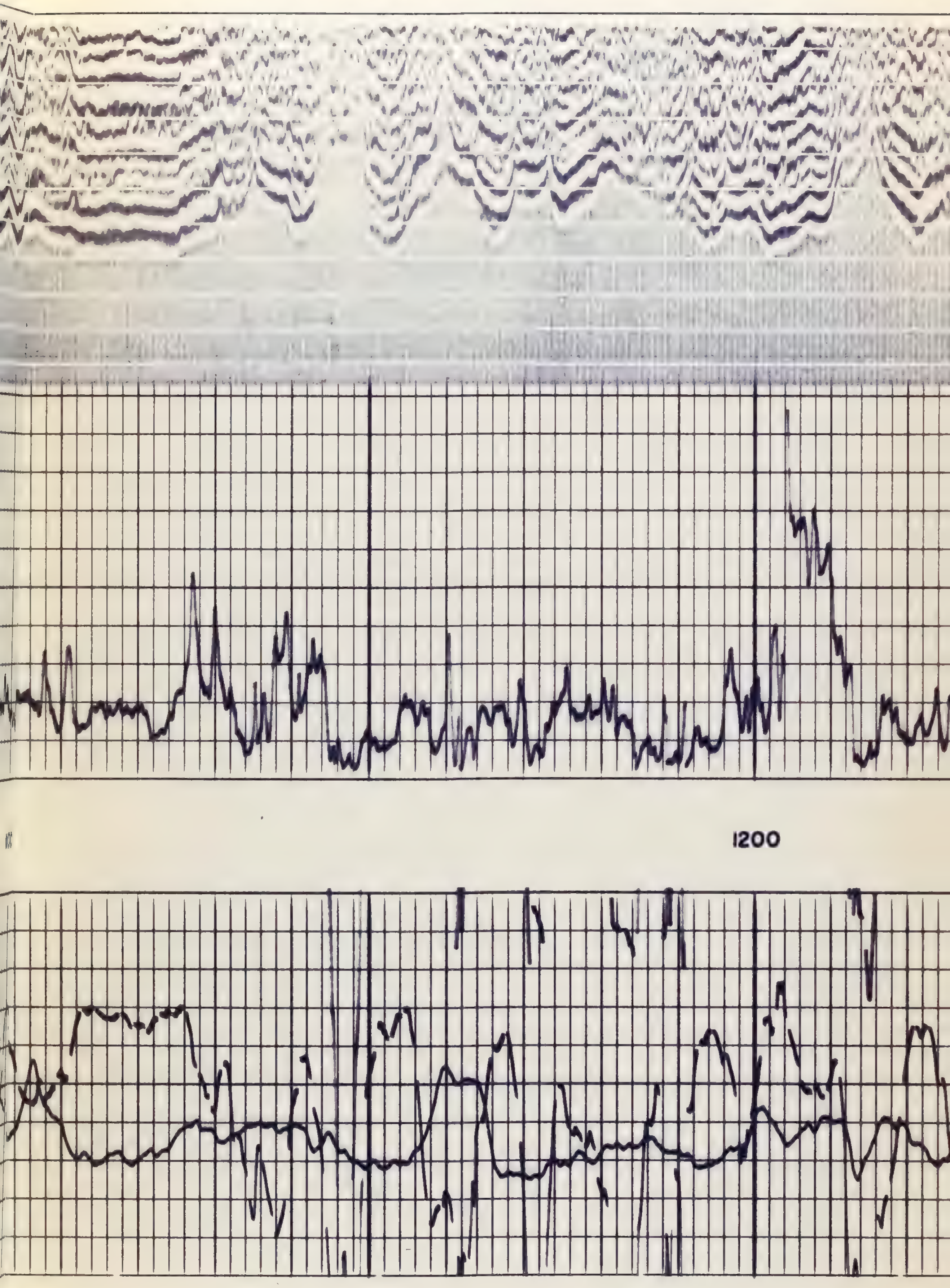
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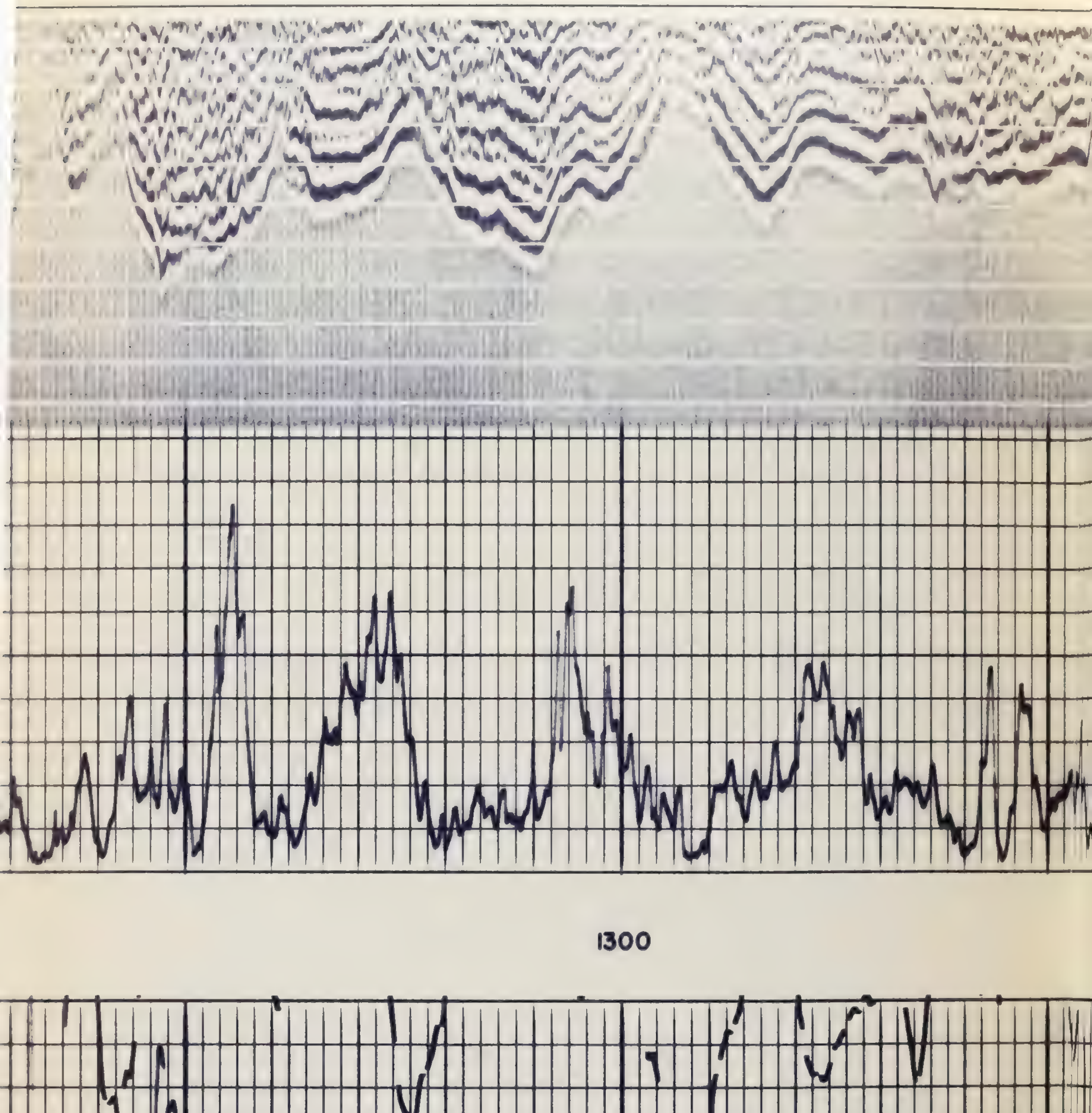

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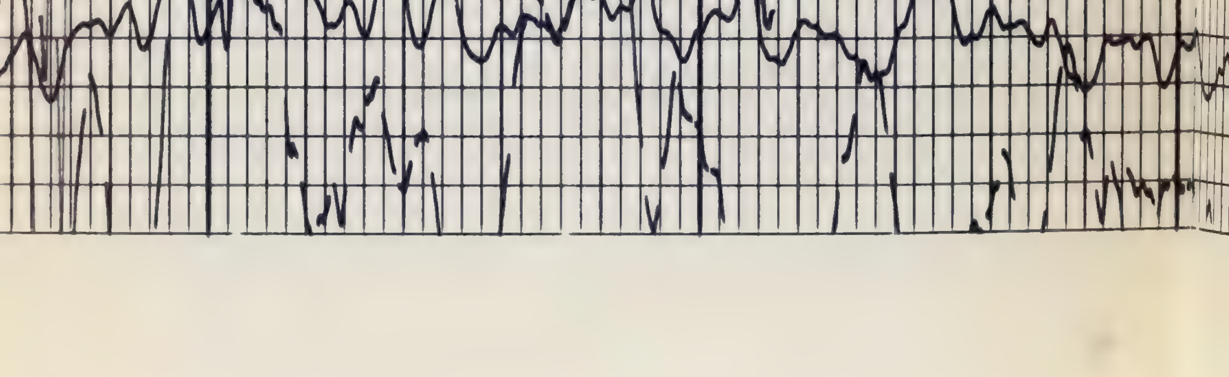

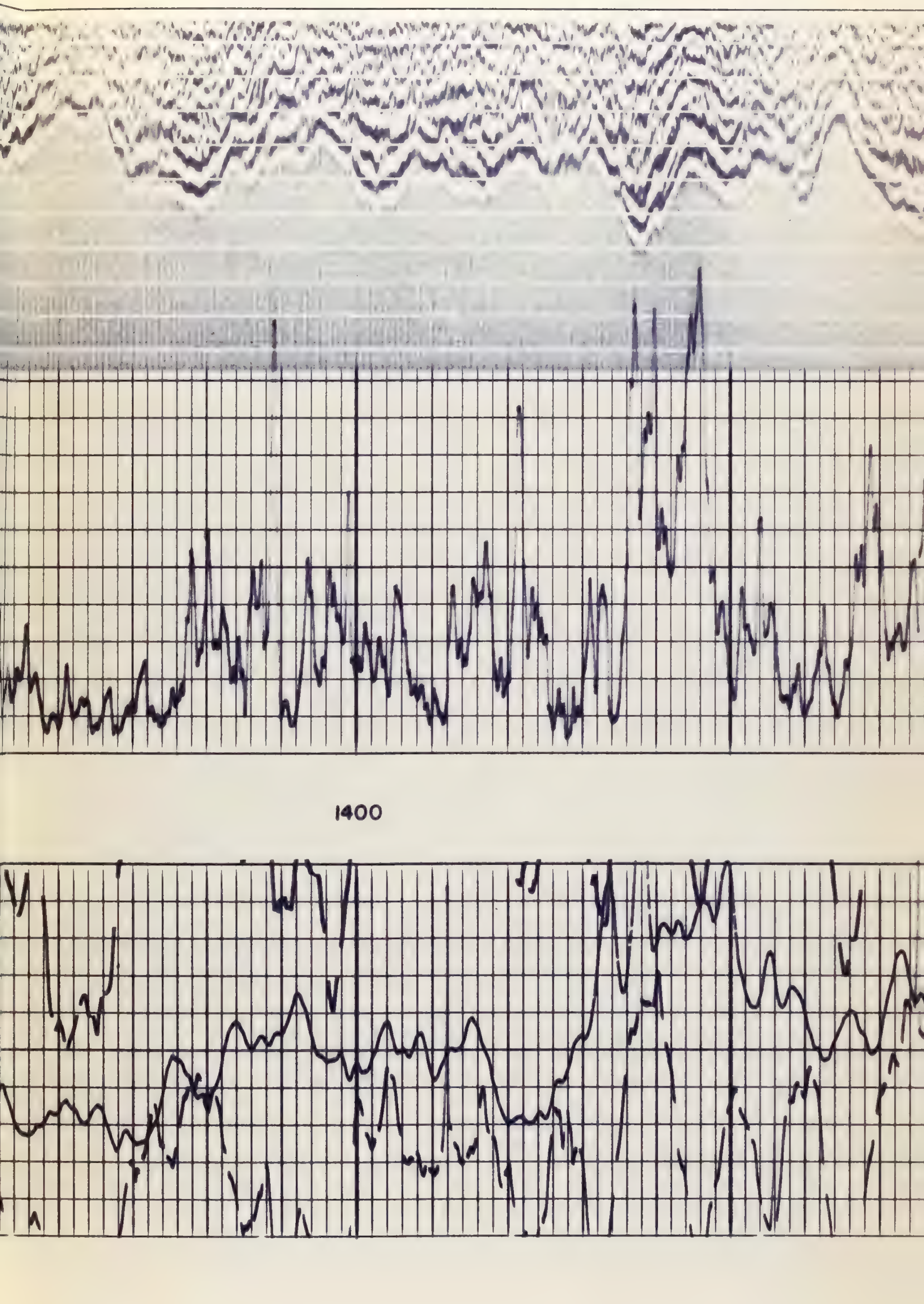
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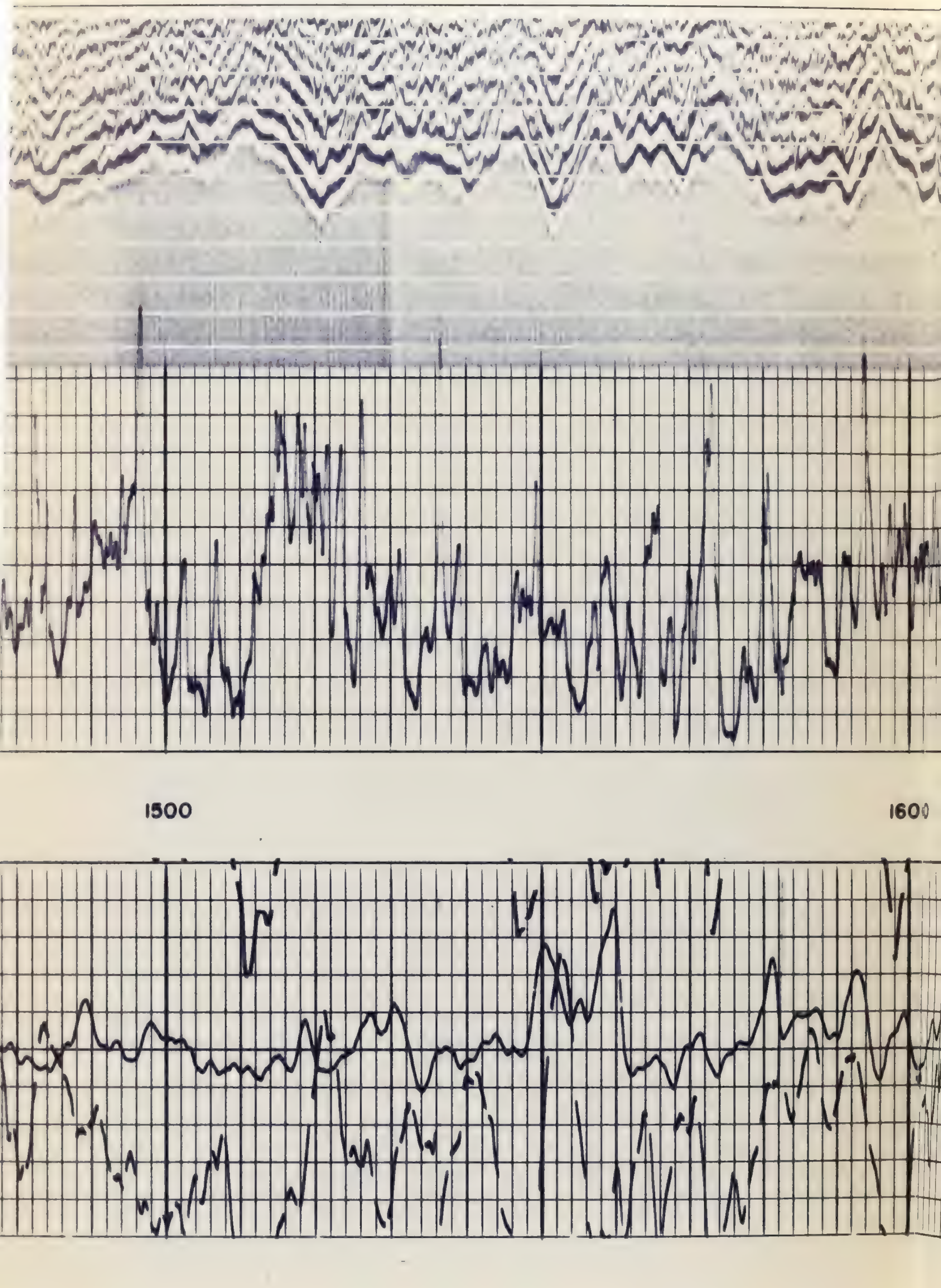
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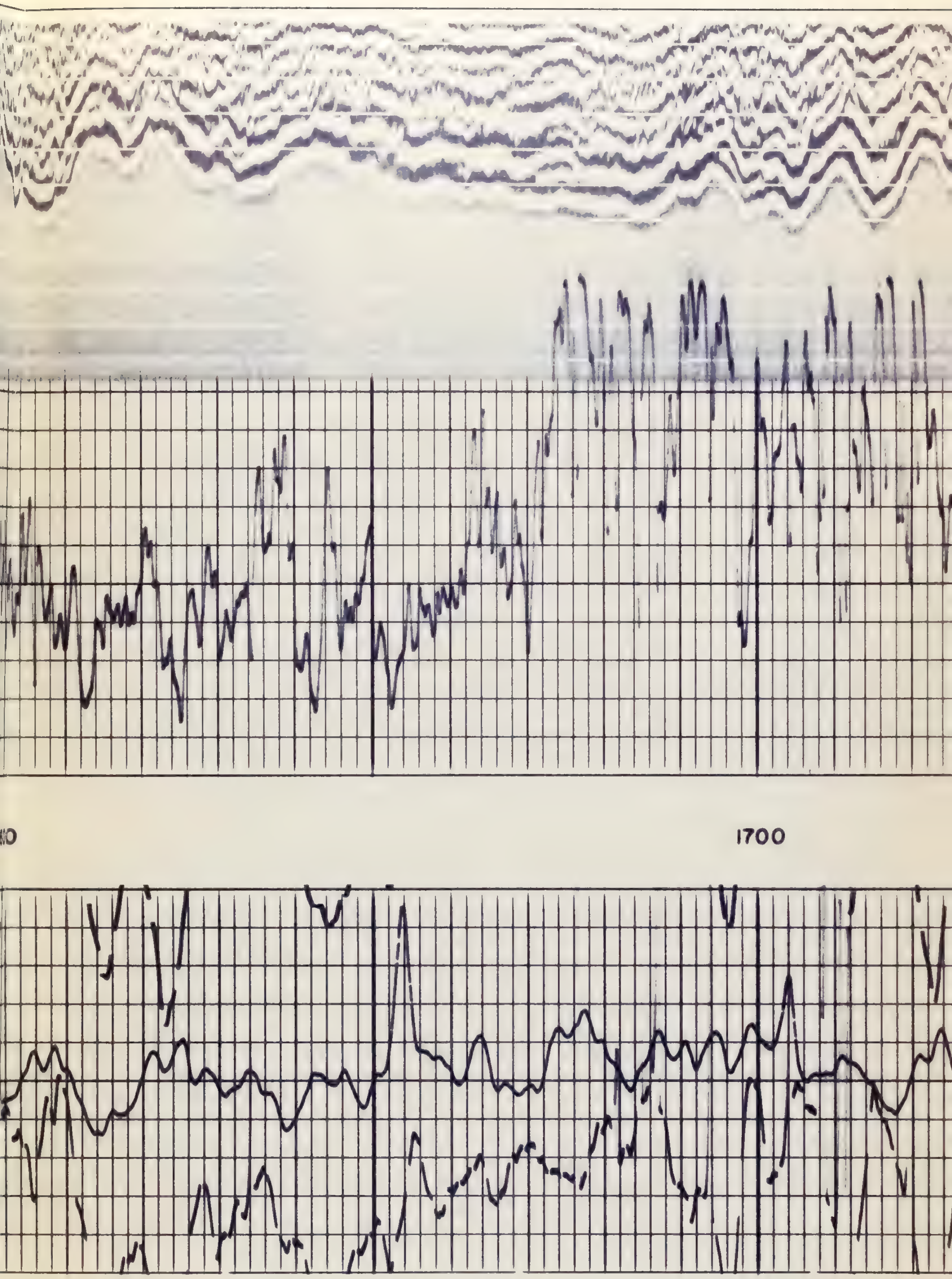
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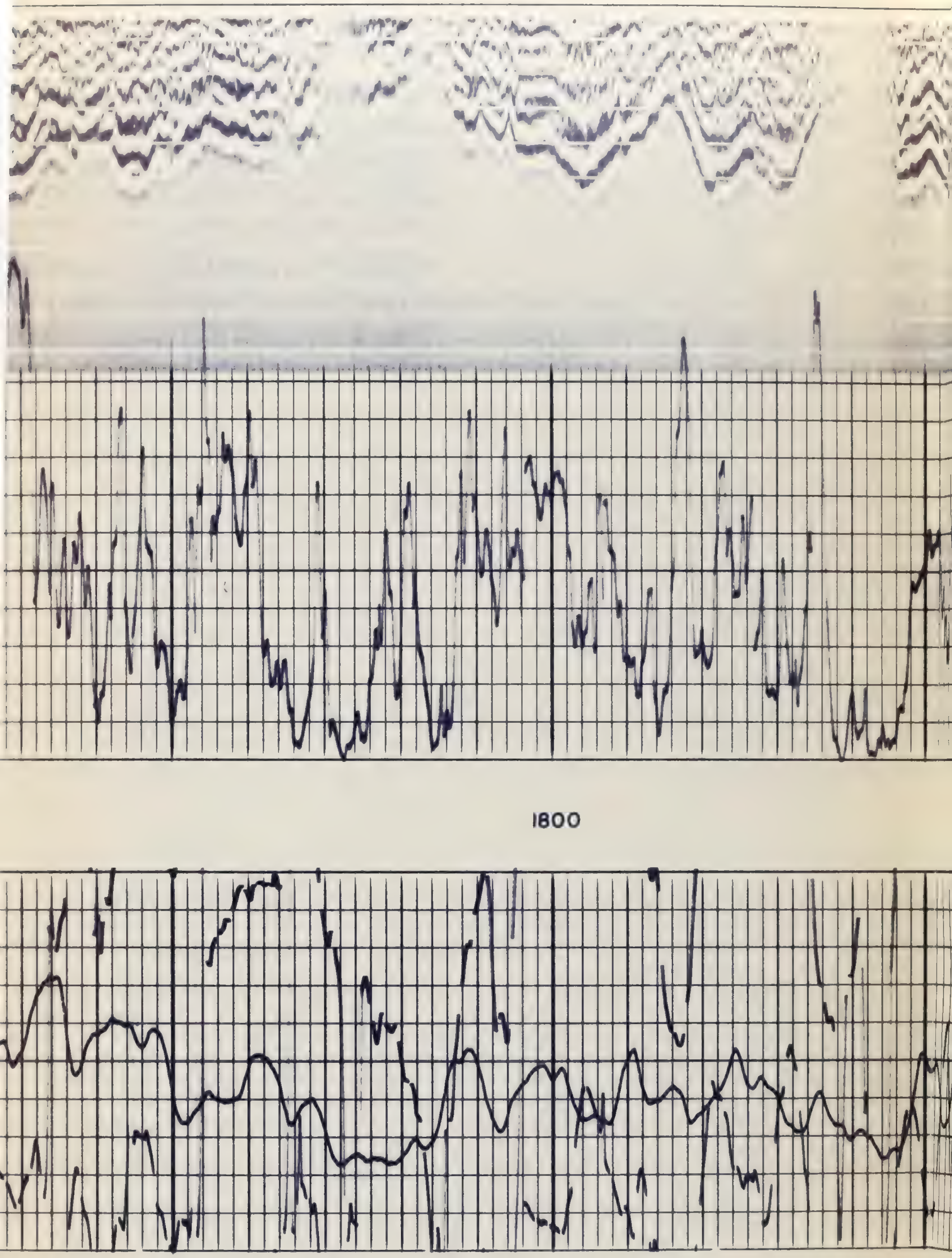
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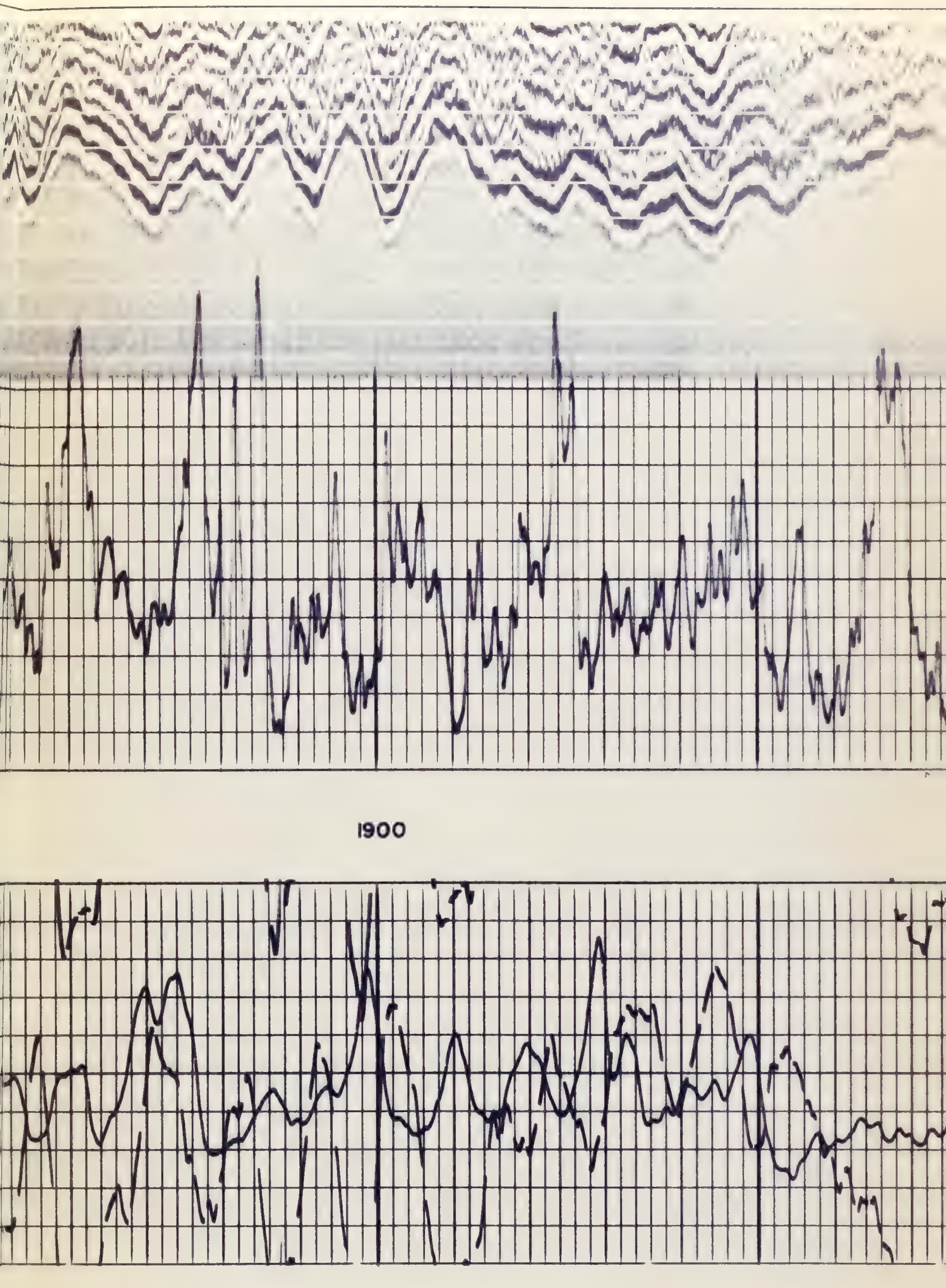
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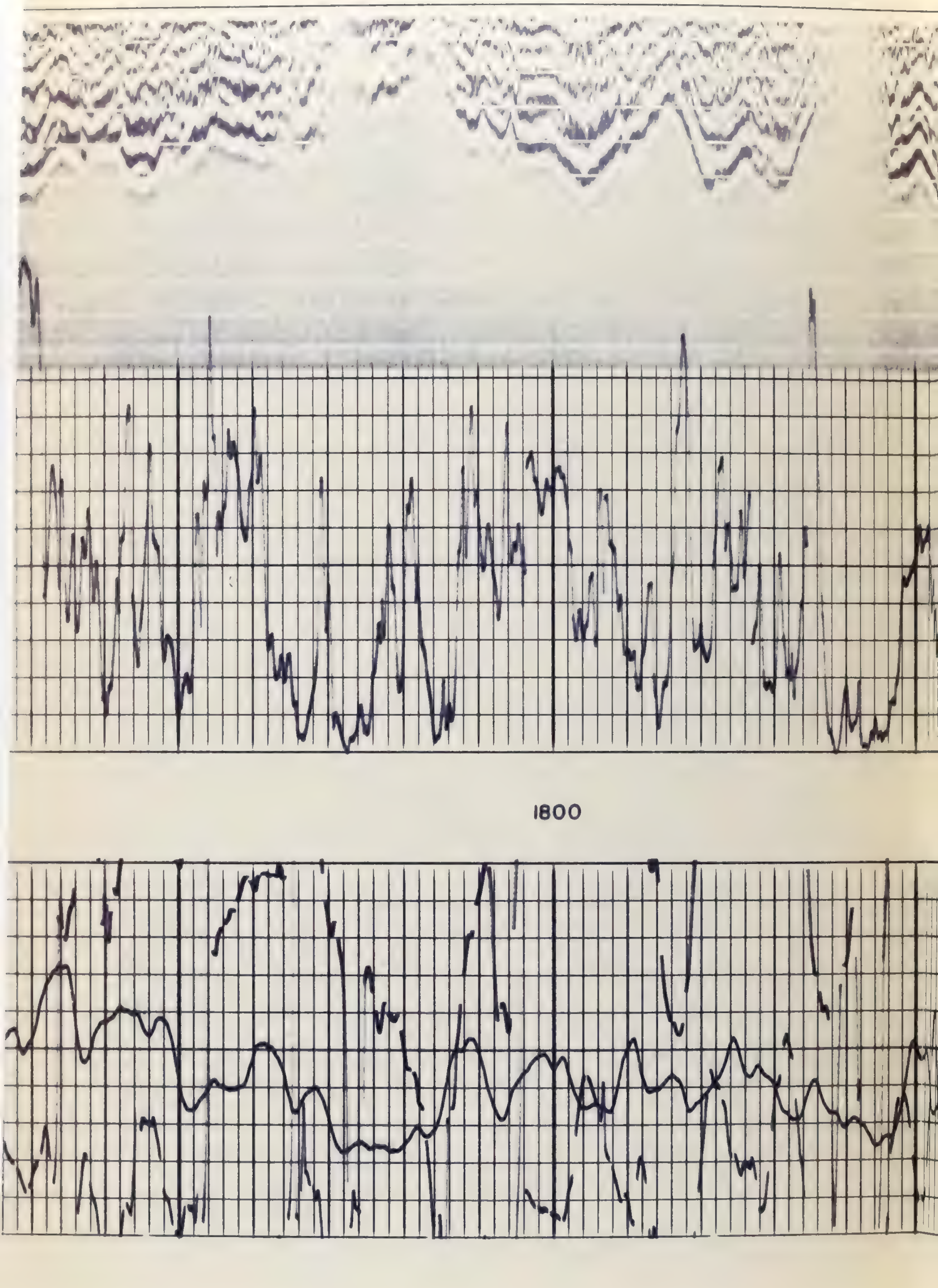

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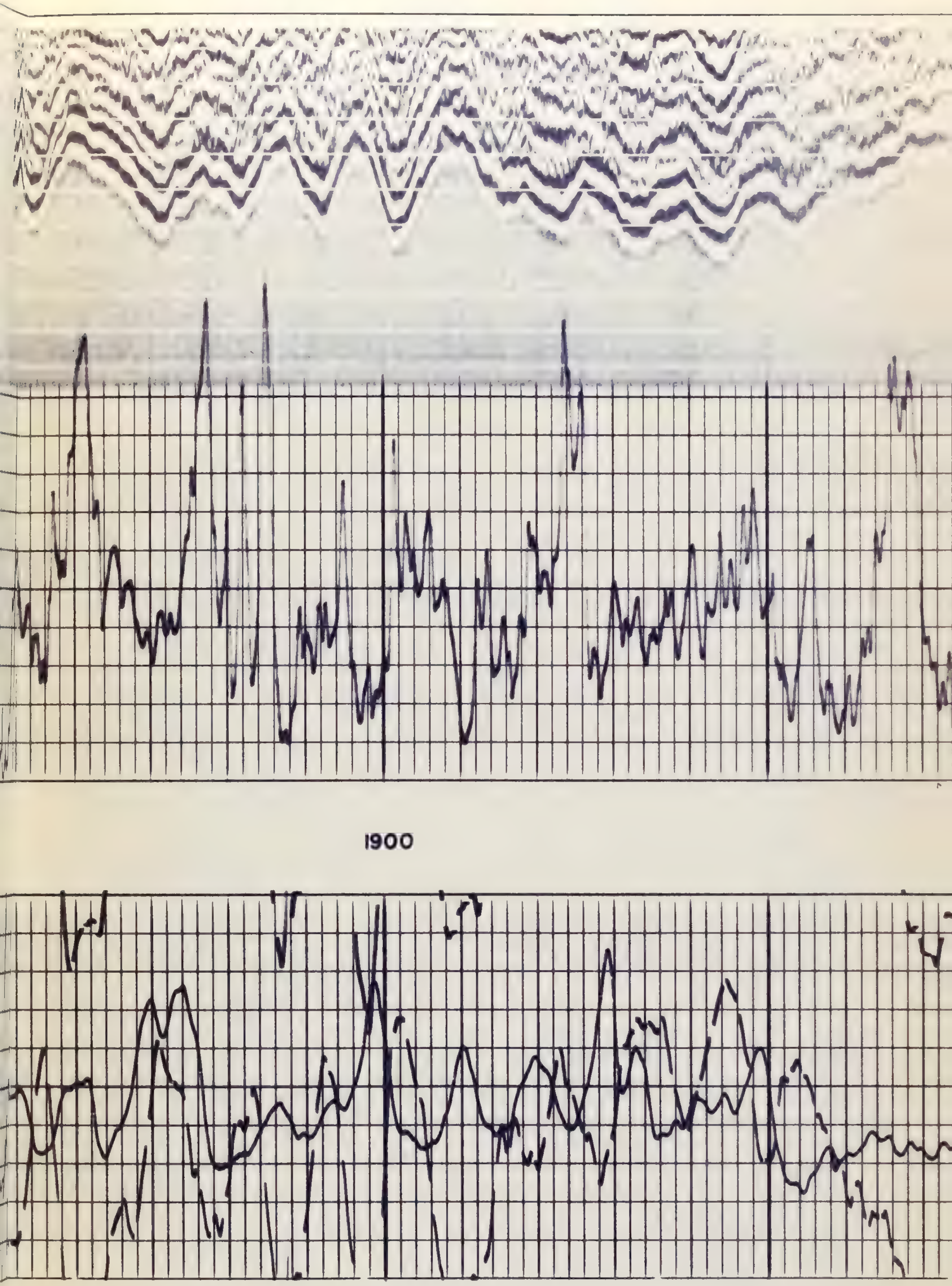
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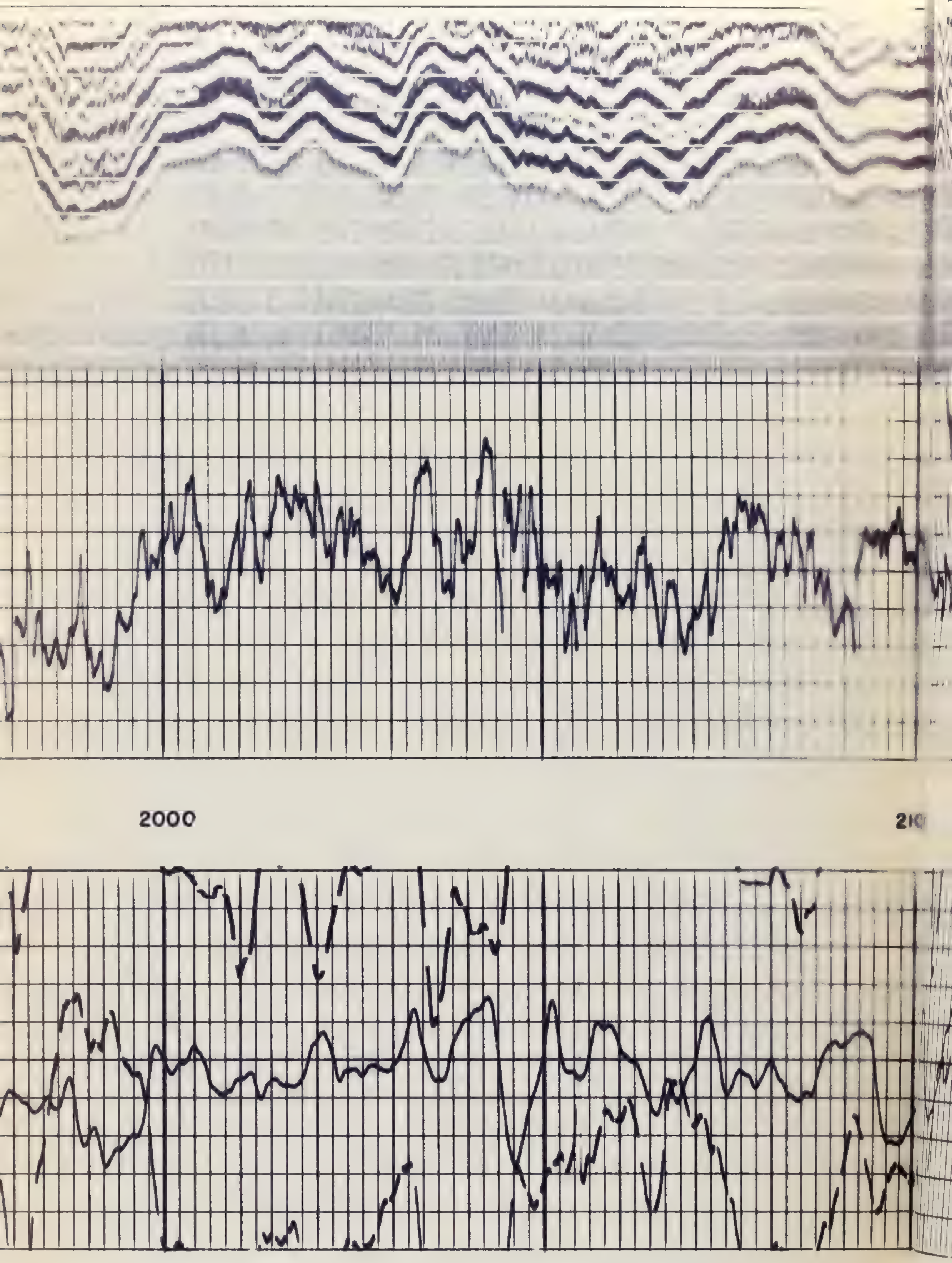
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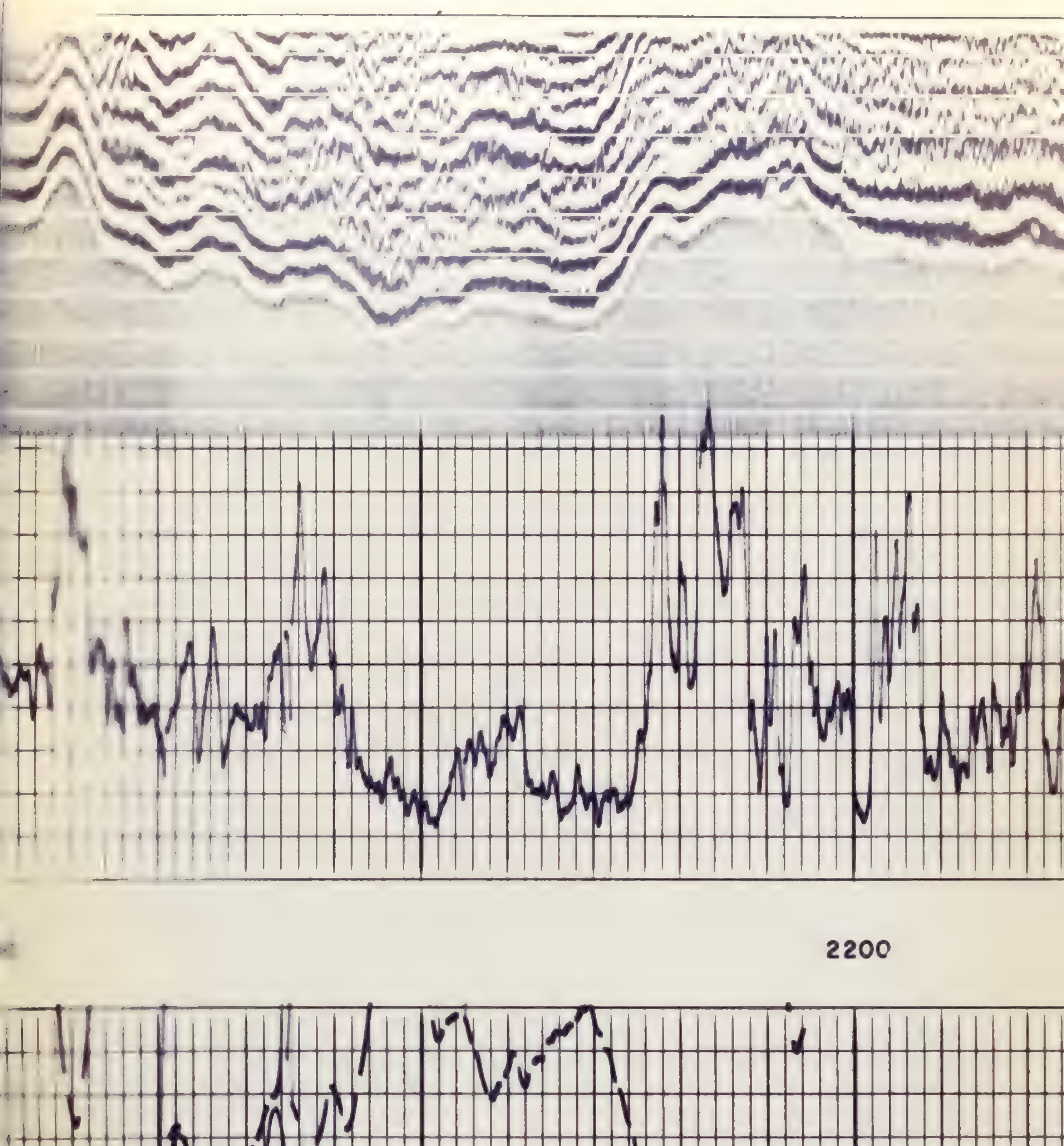
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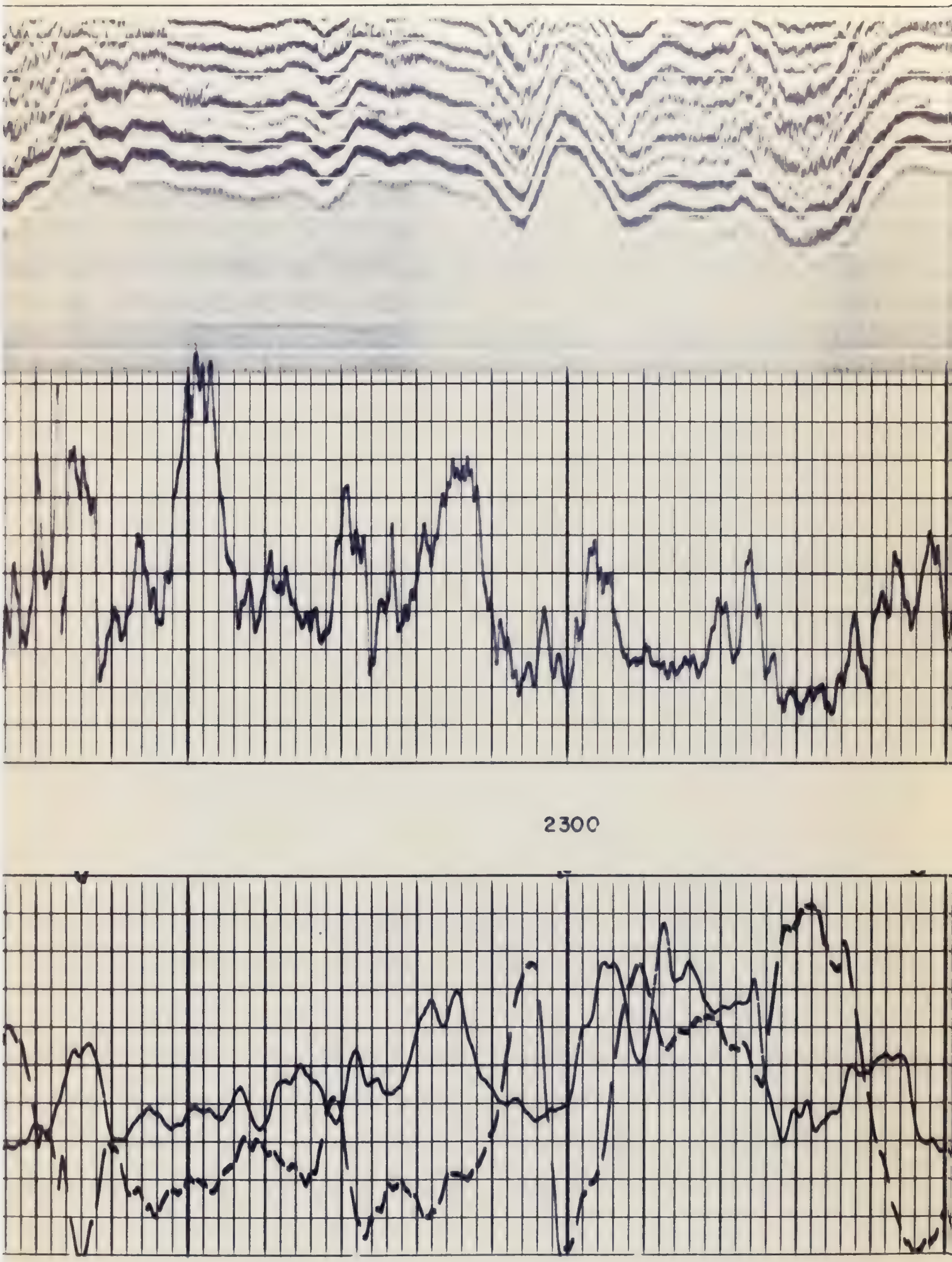
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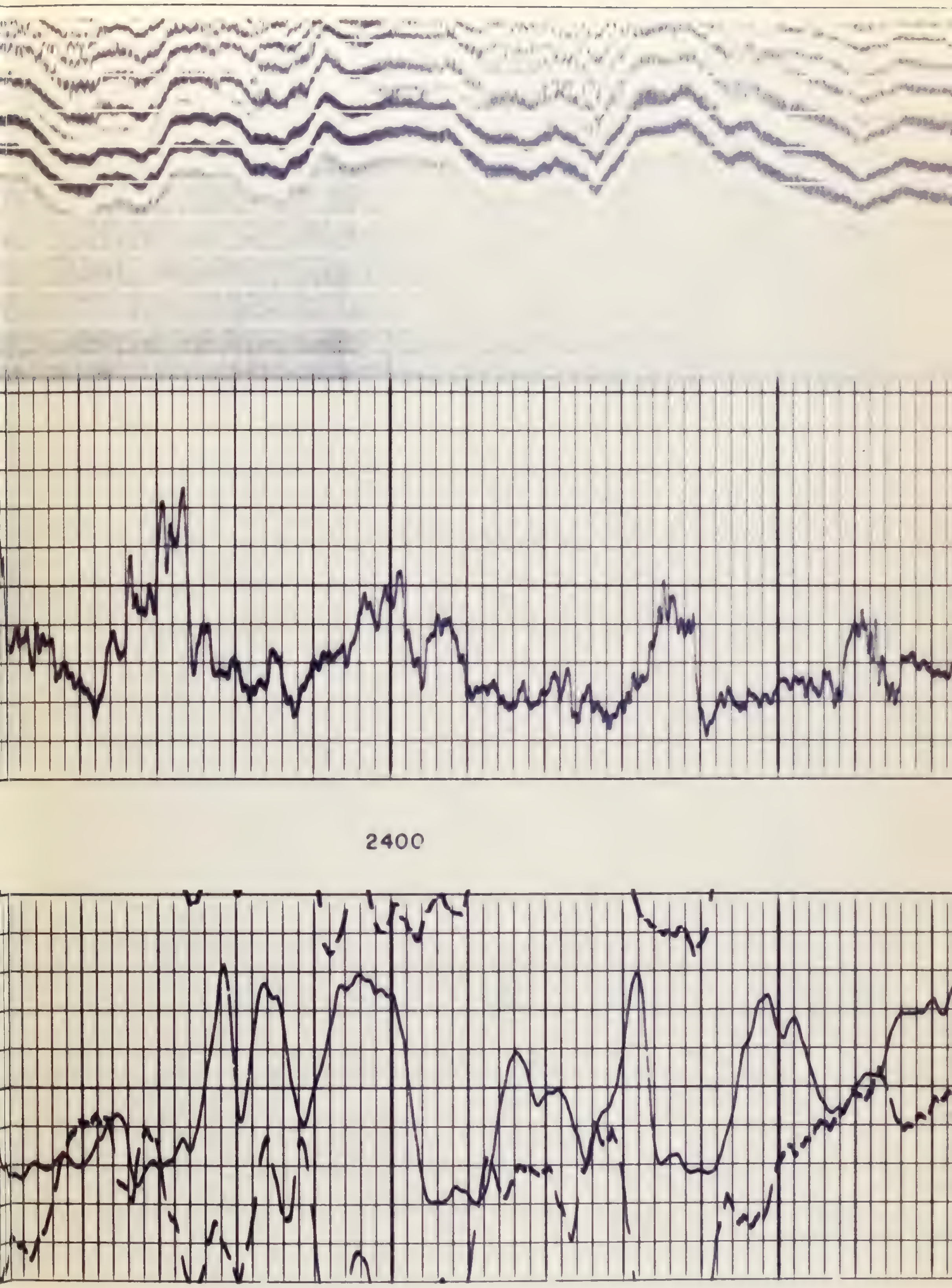
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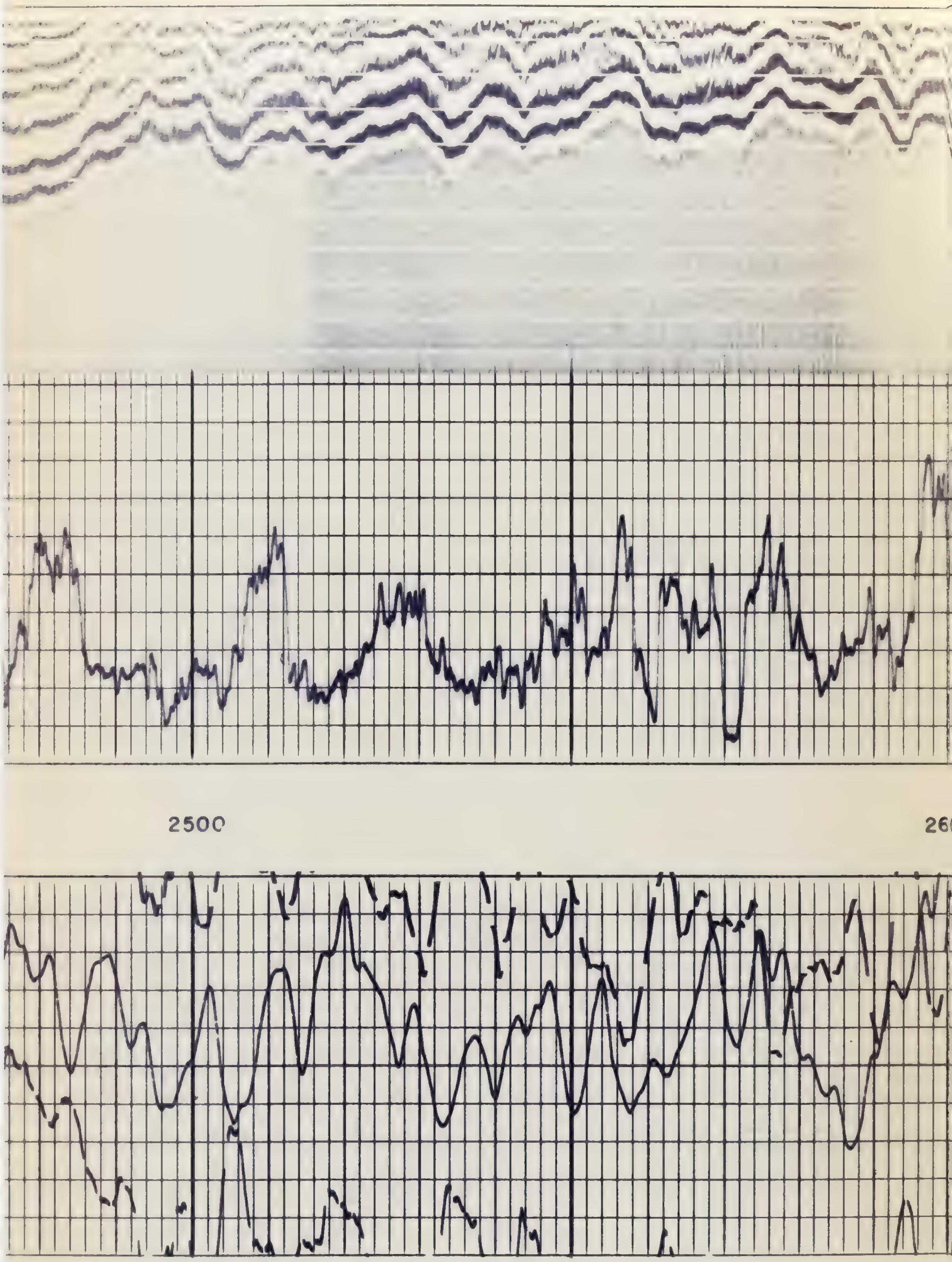
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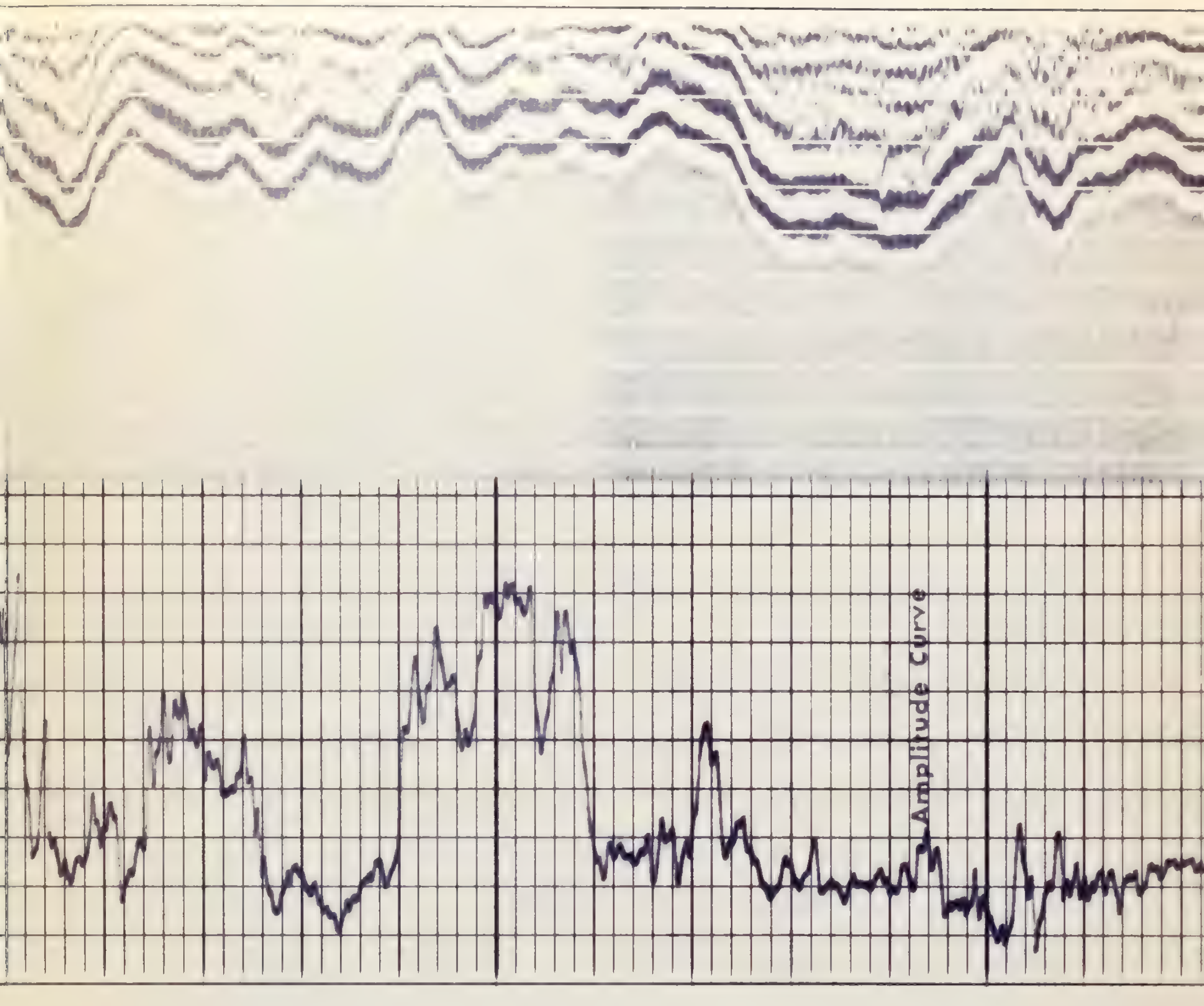
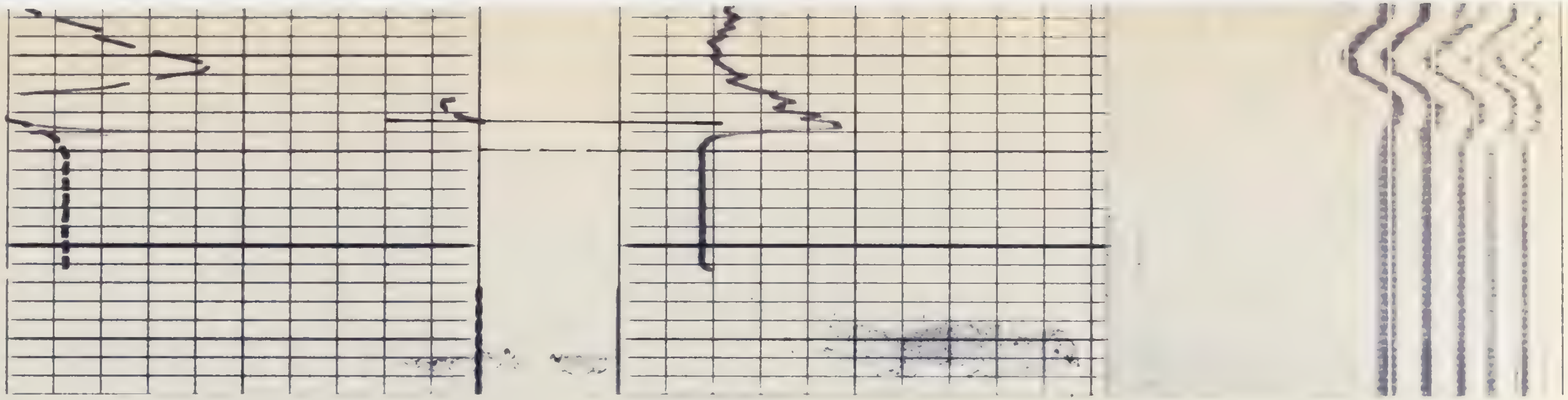
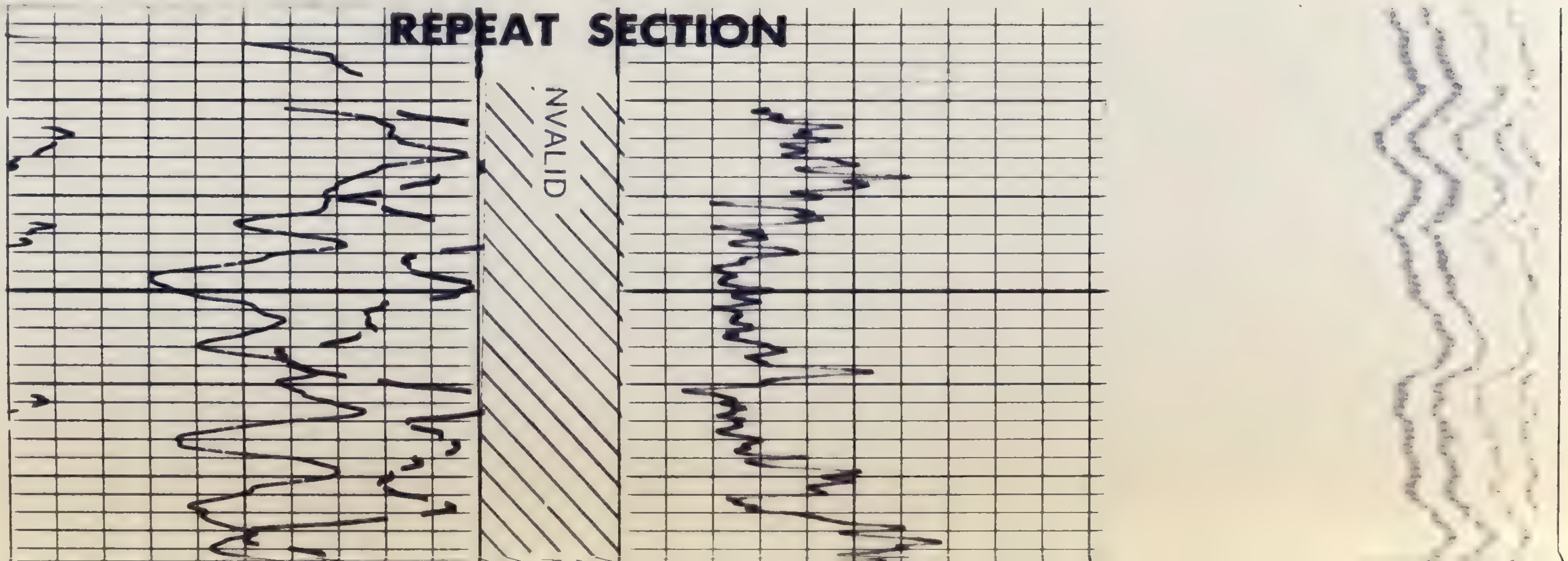

Amplitude Curve
600
2700
ΔT
GR
GR FR

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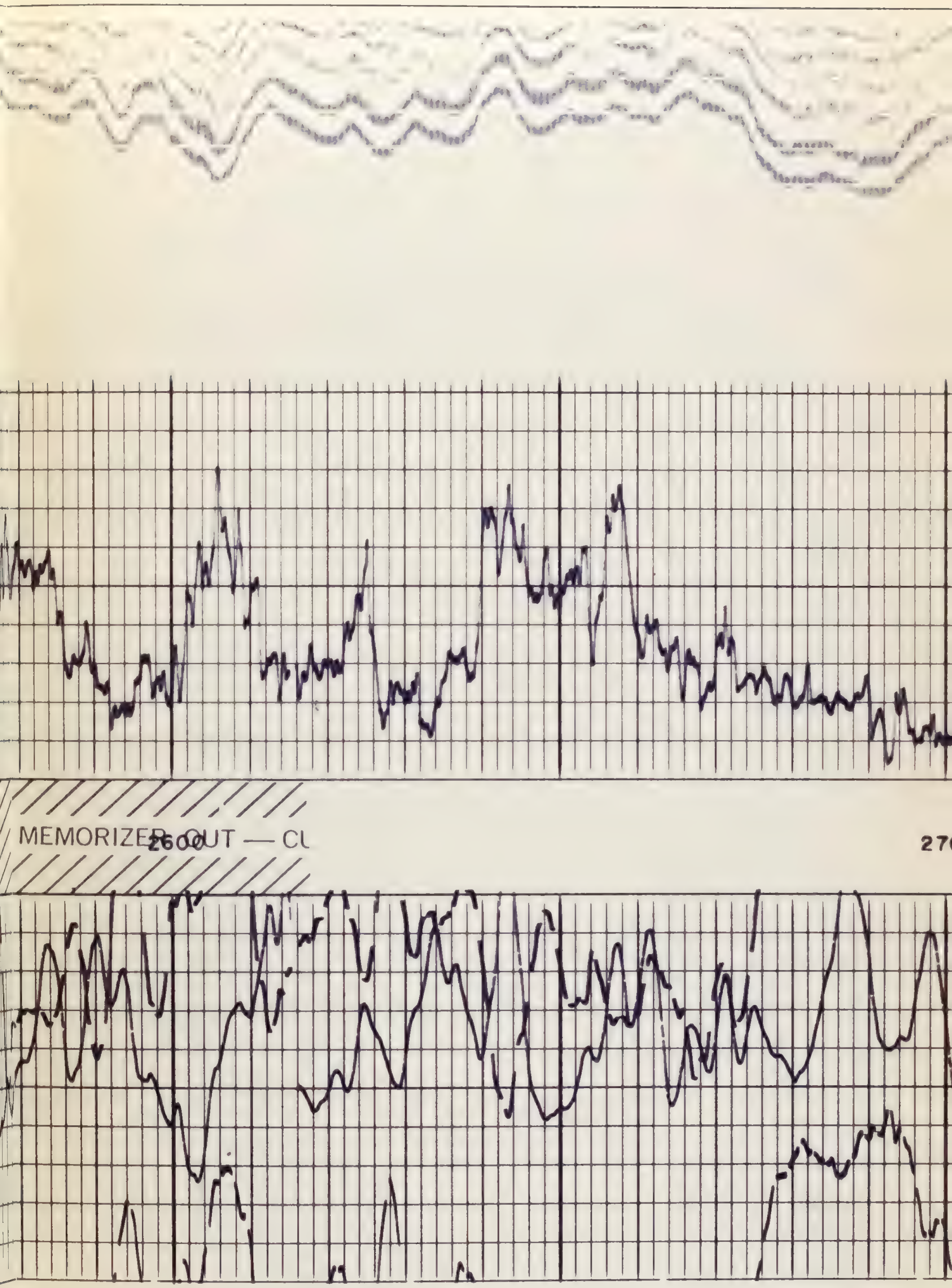
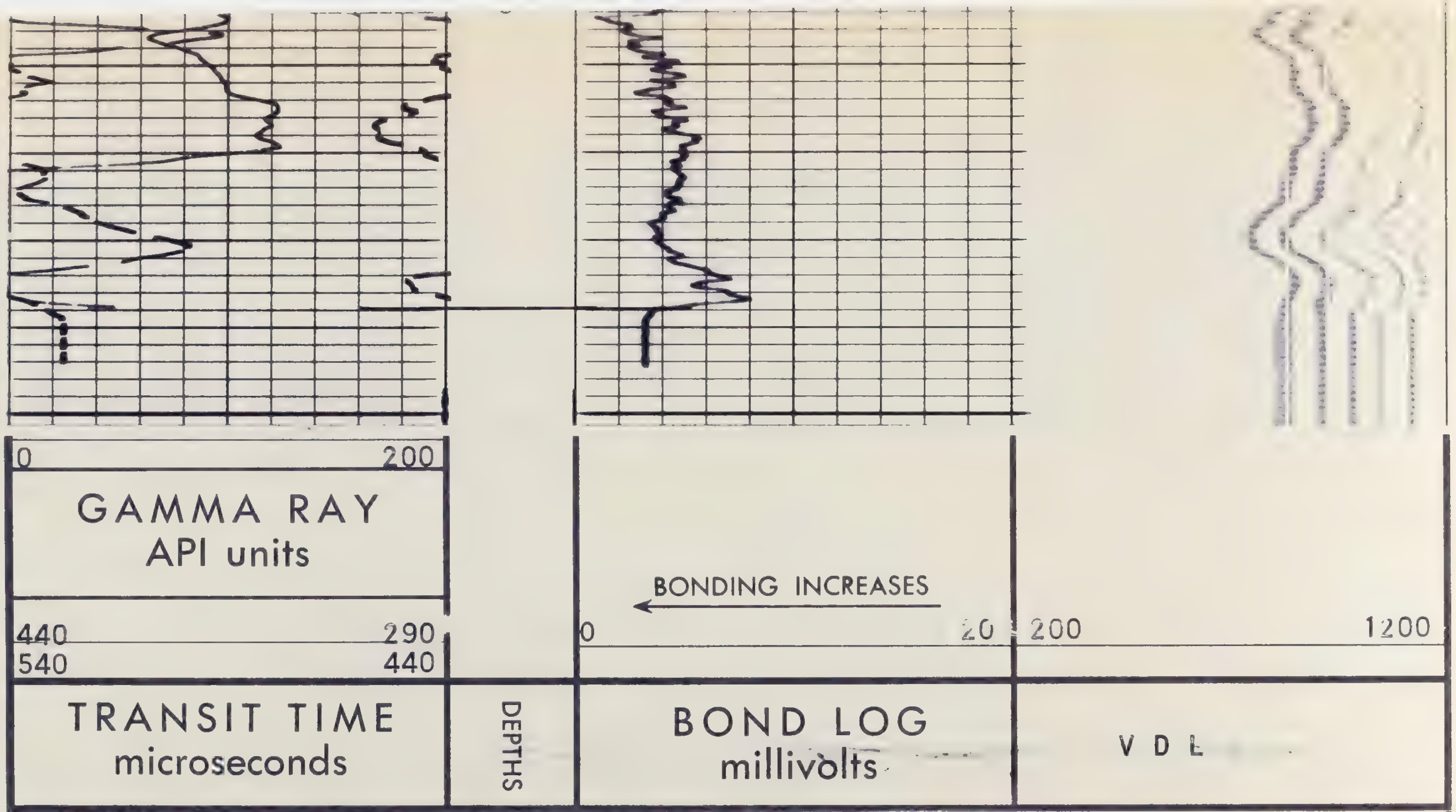
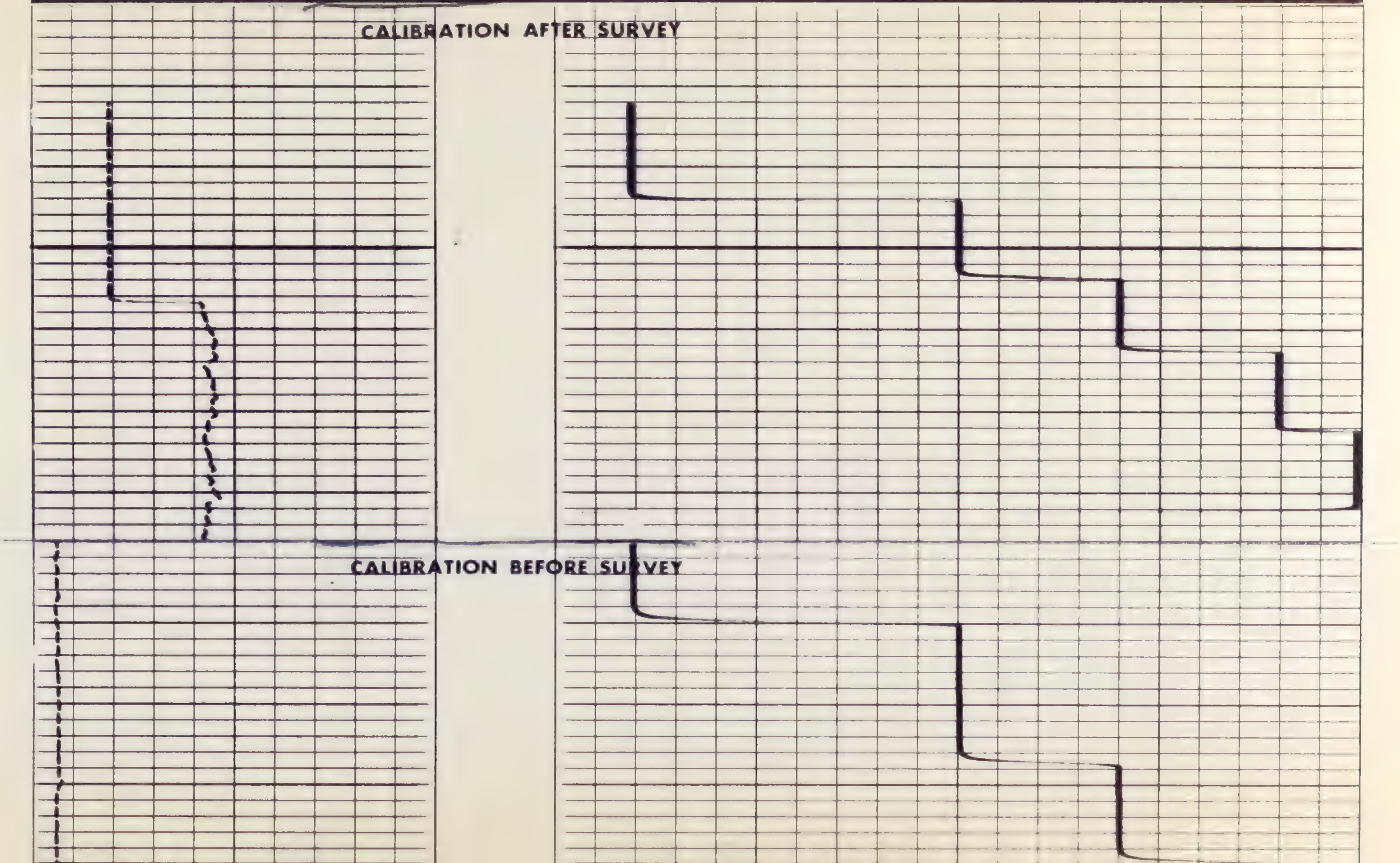

MEMORIZER OUT — CL
2600
27

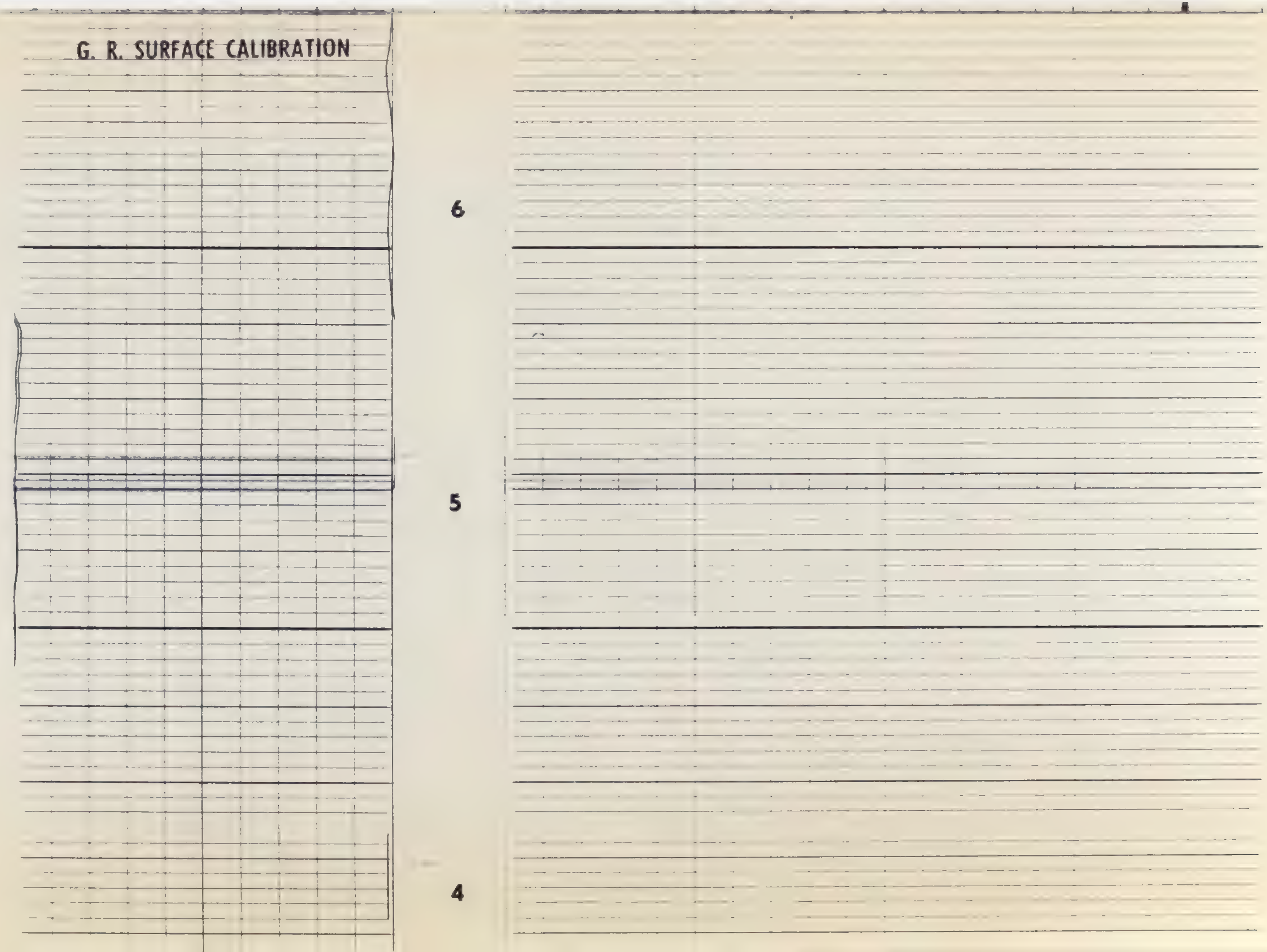


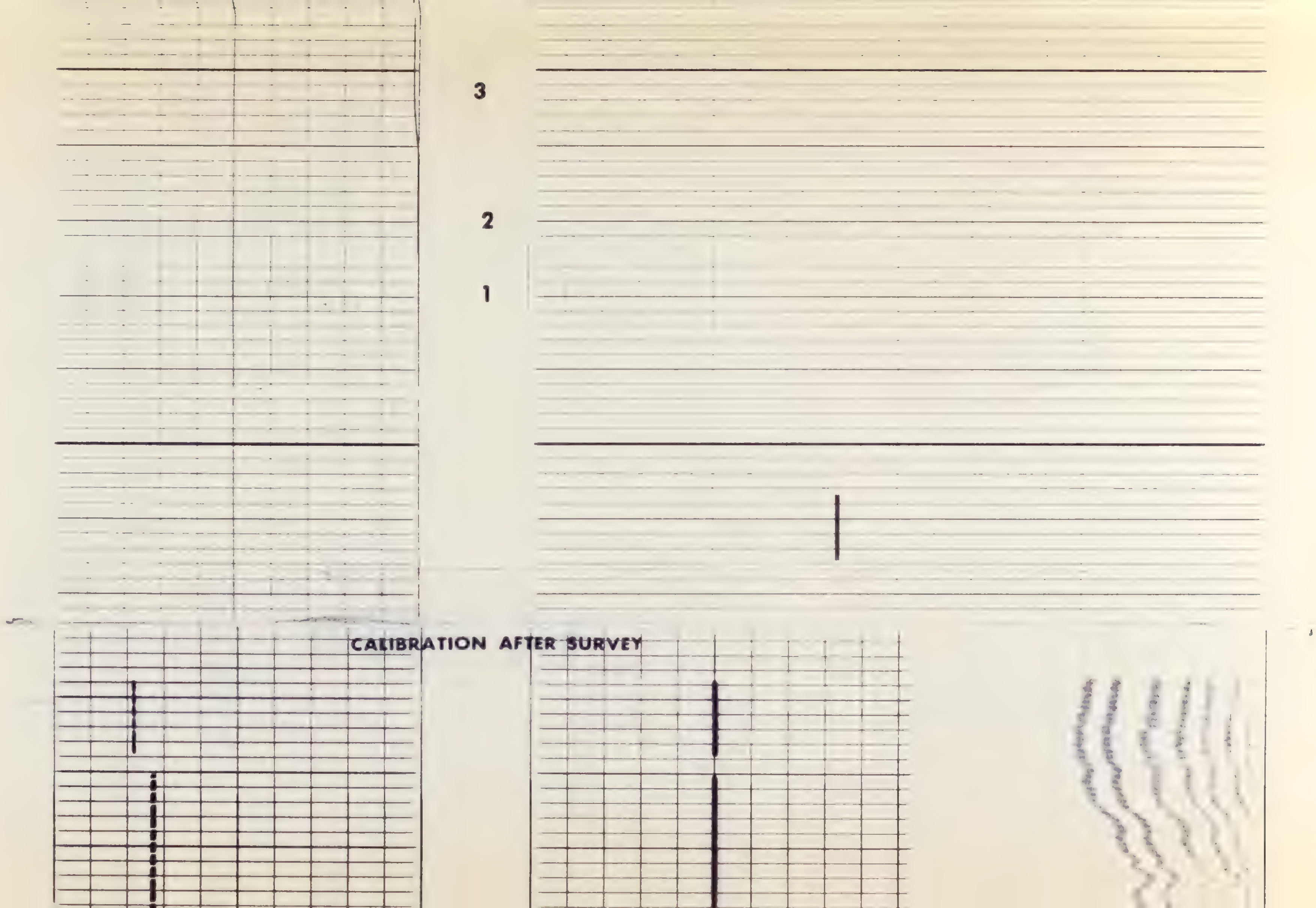
COMPANY ATLANTIC RICHFIELD COMPANY
WELL S. O. NO. 9
FIELD SORGHUM GULCH
COUNTY RIO BLANCO STATE COLORADO

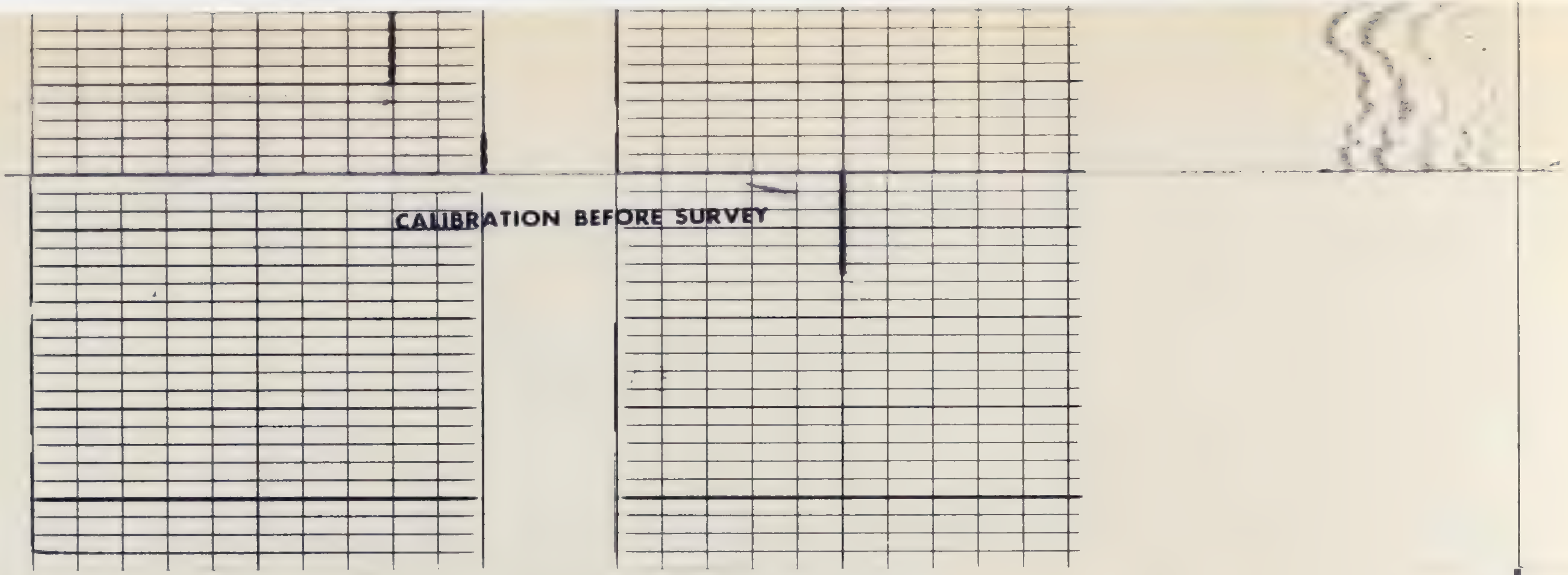
SCHL. FR 2737
SCHL. TD 2740
DRLR TD 2750
Elev: KB 6878
DF
GL 6870

CALIBRATION DATA




G. R. SURFACE CALIBRATION
6
5
4


3
2
1
CALIBRATION AFTER SURVEY



COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

SCHL FR 2737
SCHL TD 2740
DRLR TD 2750
Elev:
KB 6878
DF
GL 6870

Schlumberger

LATEROLOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL S. G. NO. 9
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION

Sec. 11 Twp. 3S Rge. 97W

Other Service
BHC-GR
FDC-GR
TEMP

Permanent Datum: GL, Elev. 6870
Log Measured From GL 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 68
D.F.
G.L. 68

Date	10-24-74			
Run No.	ONE			
Depth—Driller	2750			
Depth—Logger	2746			
Btm. Log Interval	2744			
Top Log Interval	490			
Casing—Driller	7 @ 64	@	@	@
Casing—Logger				
Bit Size	6-3/4			
Type Fluid in Hole	WATER & SOAP			
Dens. Visc.				
pH Fluid Loss	ml	ml	ml	
Source of Sample	PIT			
R_m @ Meas. Temp.	5.12 @ 72 °F	5.54 @ 72 °F	5.51 @ 72 °F	@
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: R_{mf} R_{mc}				
R_m @ BHT	@ °F	@ °F	@ °F	@
Time Since Circ.	26 HOURS			
Max. Rec. Temp.	132 °F	°F	°F	
Equip. Location	5602 GJ			
Recorded By	BARGHOUTI			
Witnessed By	BURNS			

SWS—1974-B

°F °F °F °F °F ml

70

78

s:

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.				
Depth - Driller					
Type Fluid in Hole					
Dens.	Visc.				
ph	Fluid Loss		ml		ml
Source of Sample					
R_m @ Meas. Temp.		@	°F	@	°F
R_{mf} @ Meas. Temp.		@	°F	@	°F
R_{mc} @ Meas. Temp.		@	°F	@	°F
Source: R_{mf}	R_{mc}				
R_m @ BHT		@	°F	@	°F
R_{mf} @ BHT		@	°F	@	°F
R_{mc} @ BHT		@	°F	@	°F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Panel No.	795-E			
Cart. No.	772			
Sonde No.	298			
Mem. Panel No.	B-238			
G.R. Cart. No.				
G.R. Panel No.				
TTR No.				
Speed-F.P.M.				

REMARKS

Service Order No. - 22425

API Serial No. -

BIT SIZE:

8 5/8	0-64
7 7/8	64-1200
6 3/4	1200-2750

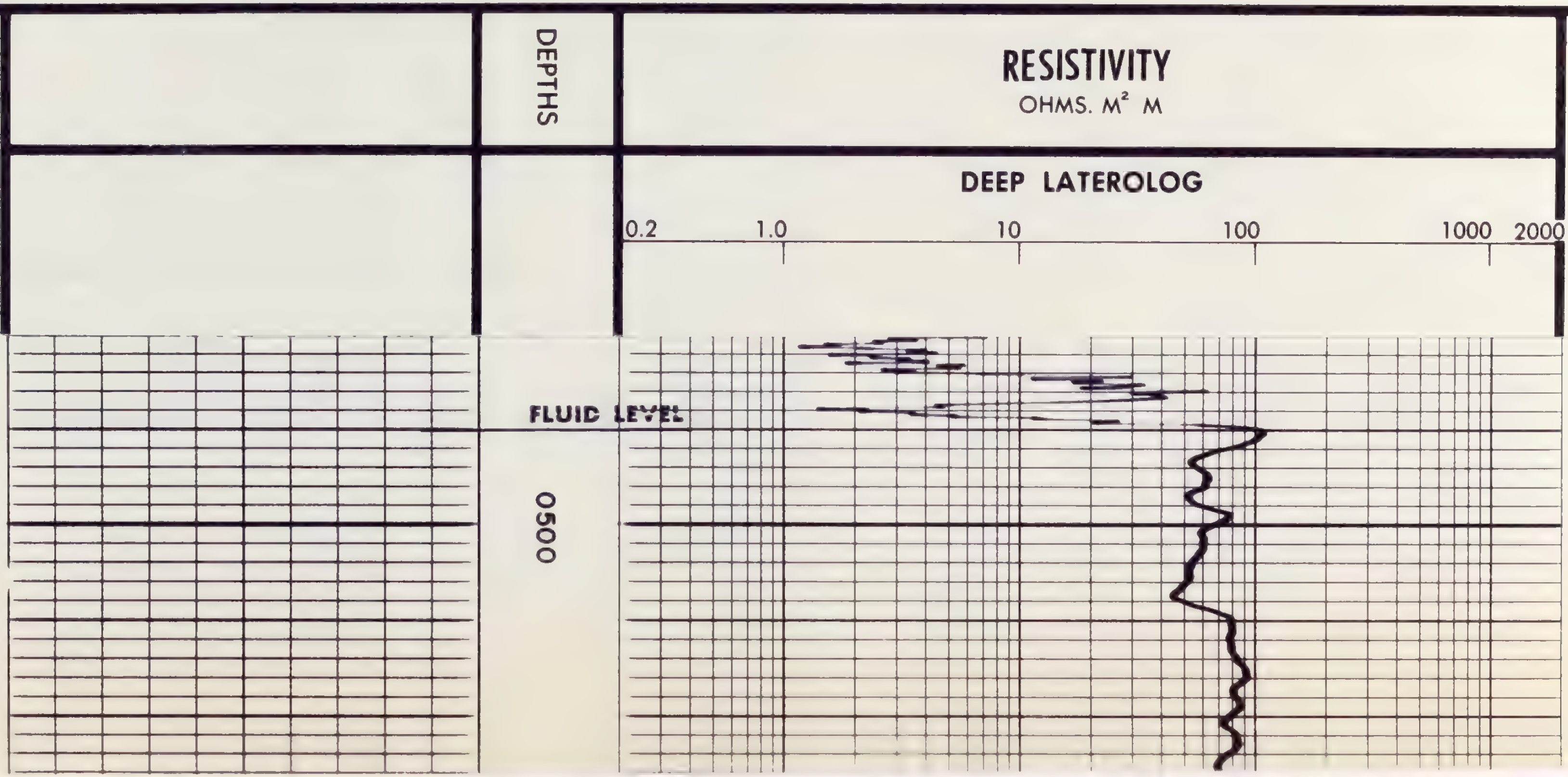
LL_s NOT PRESENTED AS IT WAS CONSIDERED INVALID.

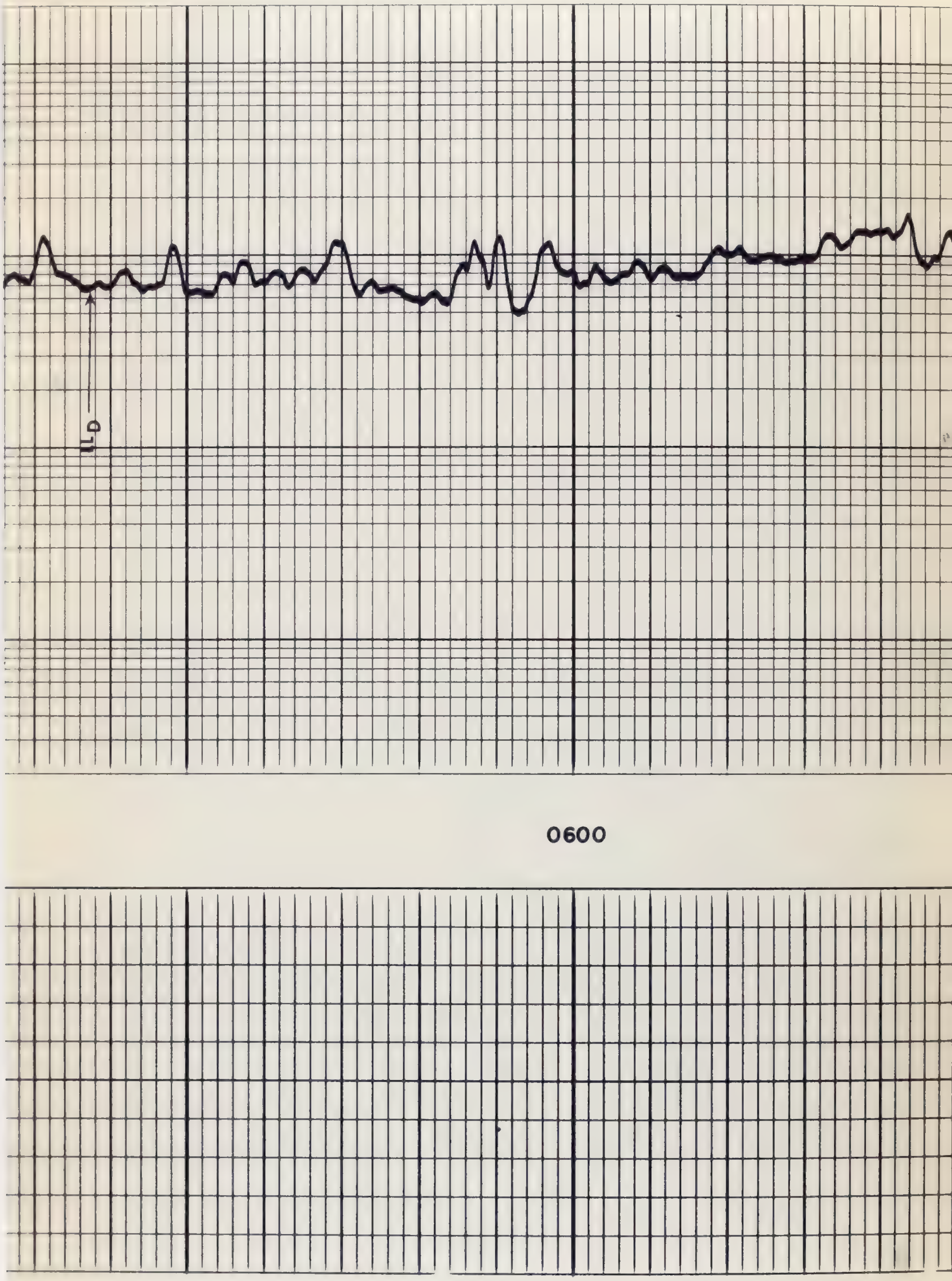
LL_d NOT TIED INTO BHC-GR-FDC

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.	
GAMMA RAY:							

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

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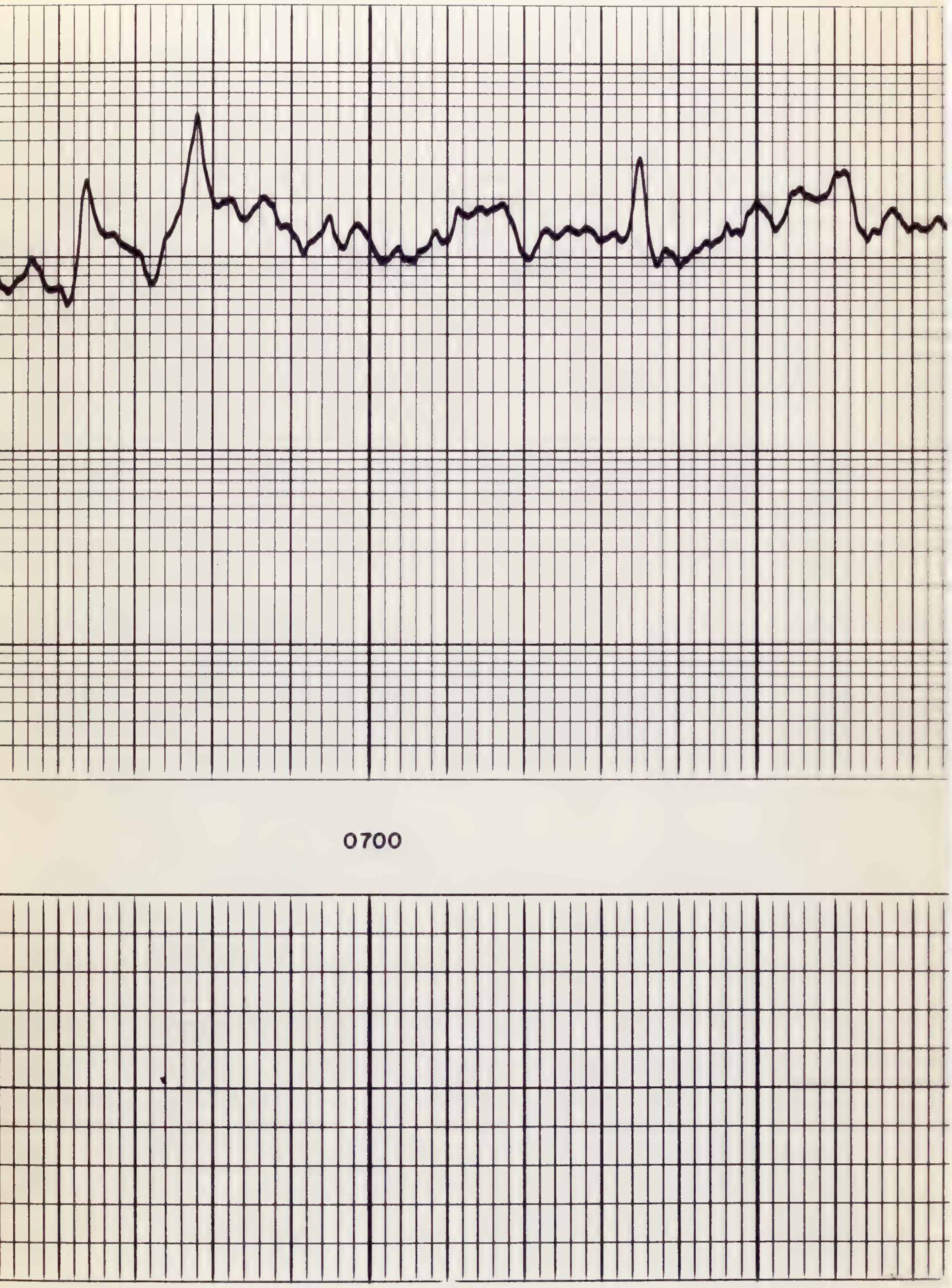
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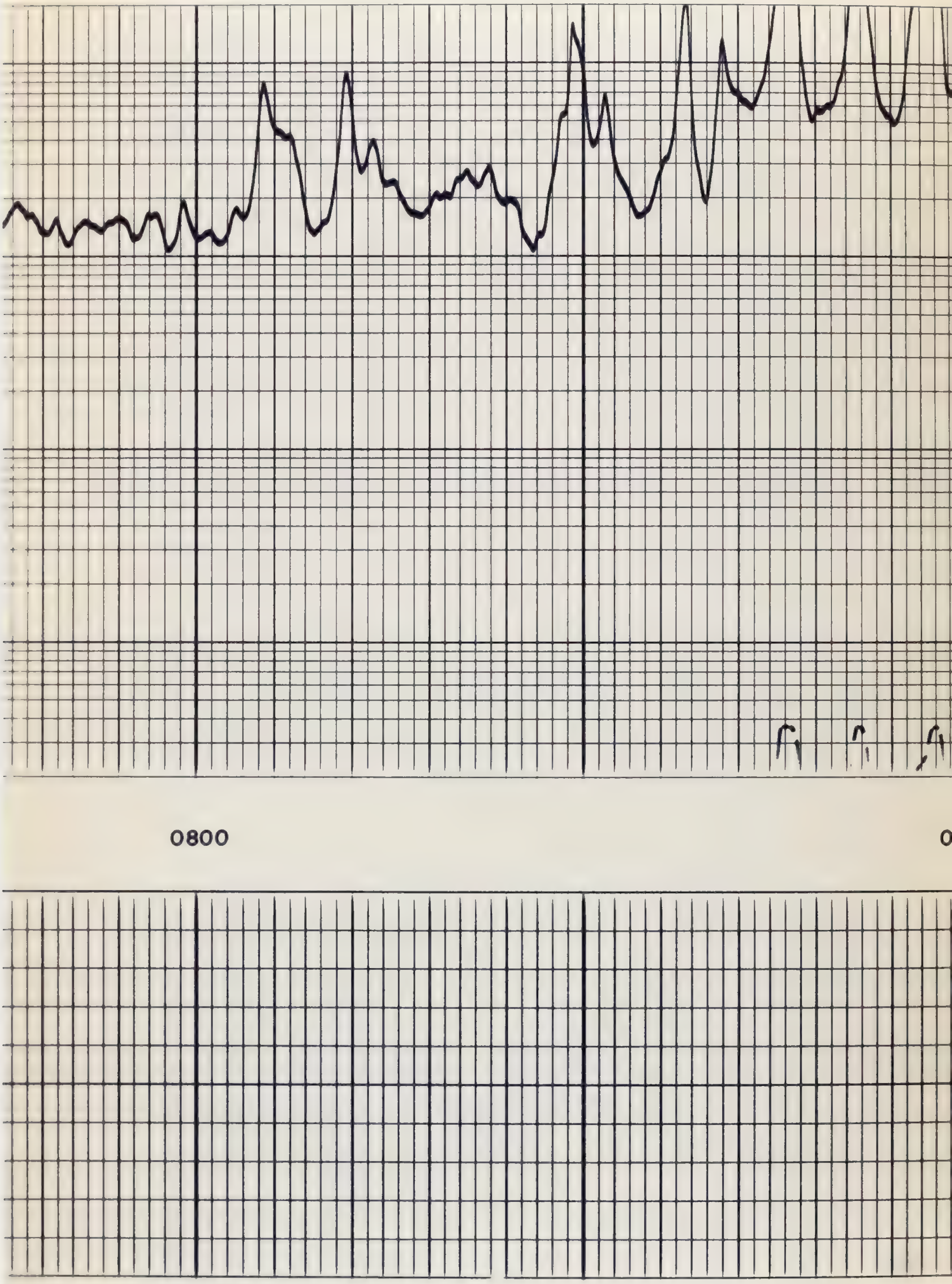
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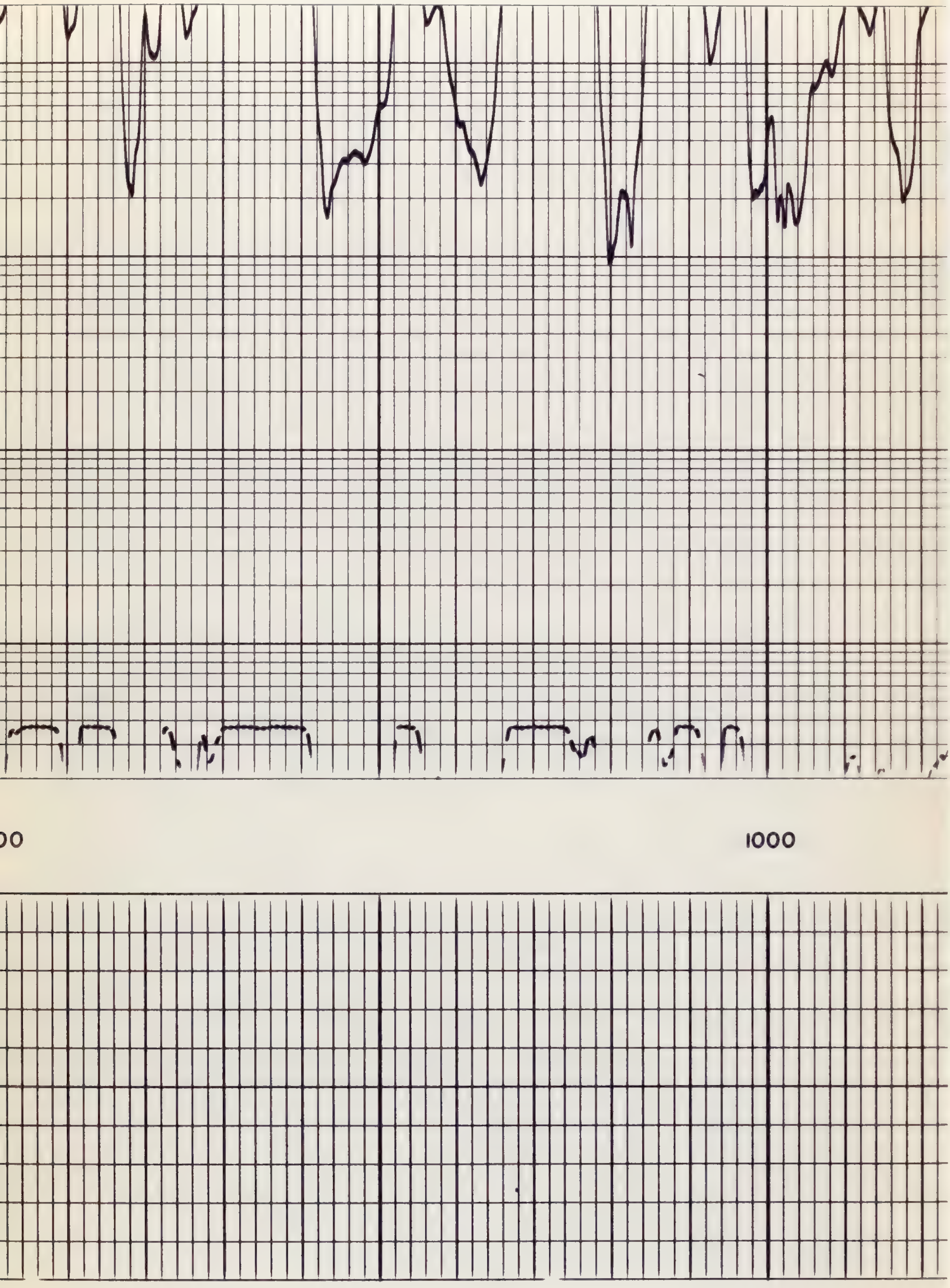
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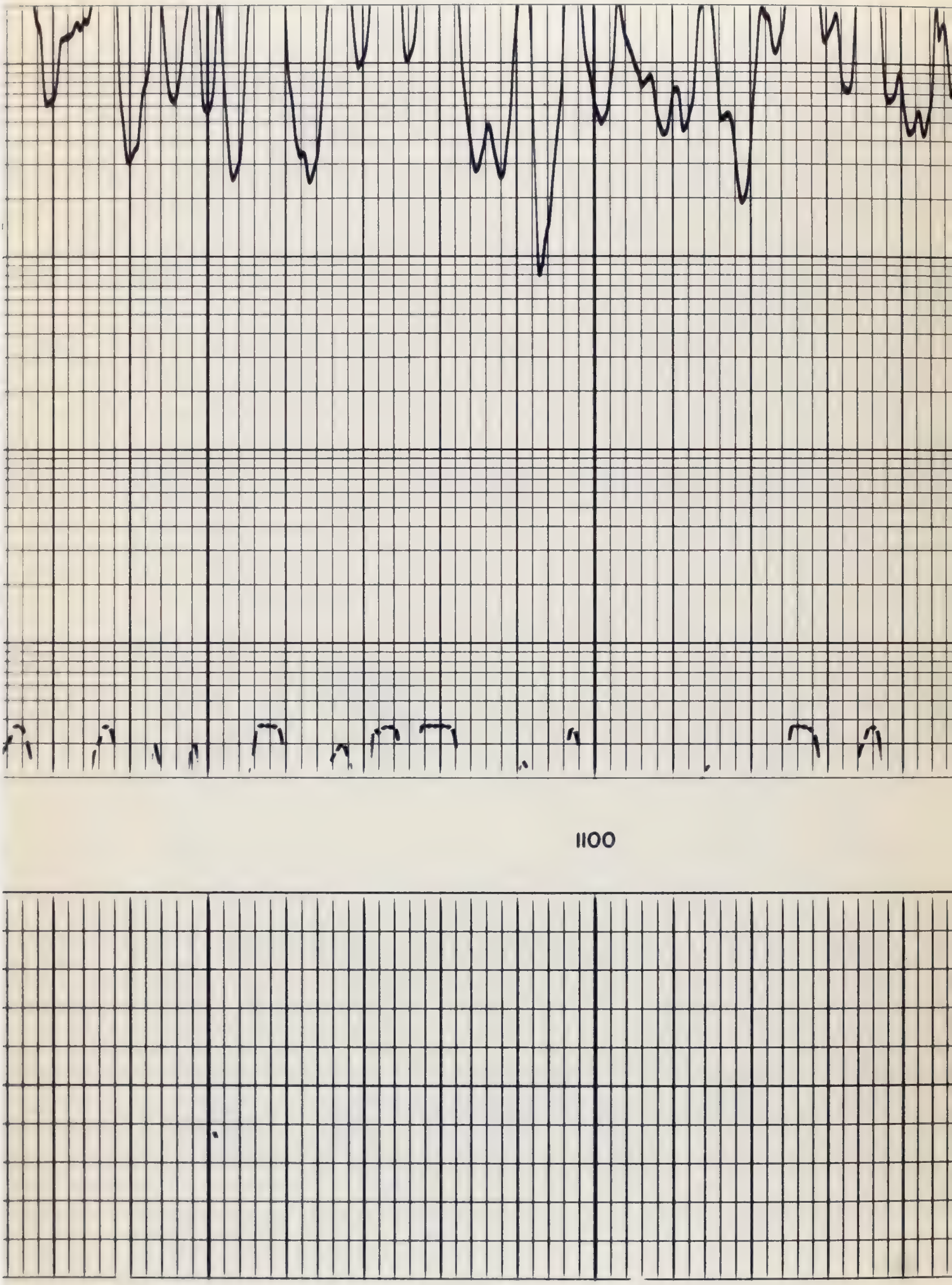
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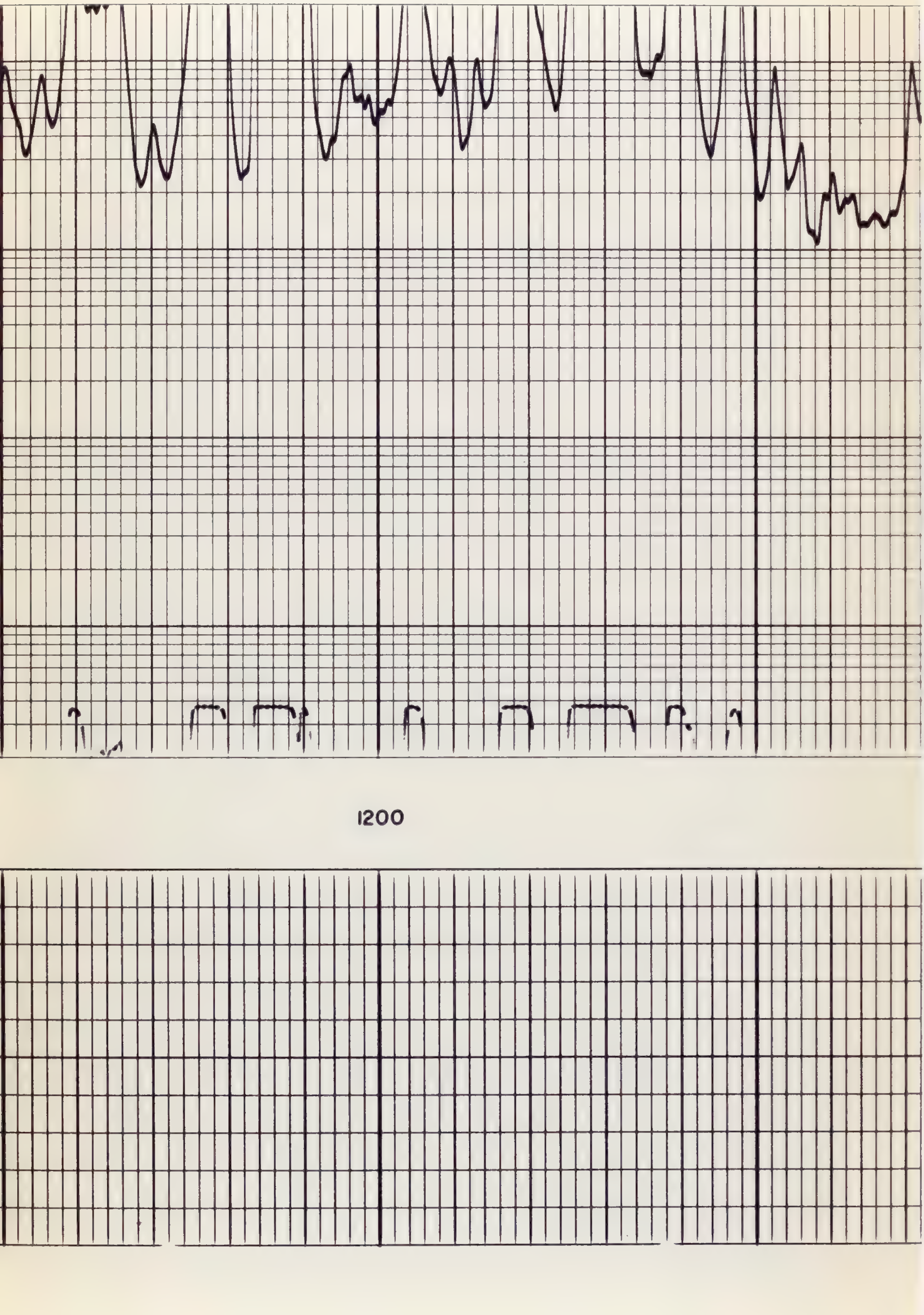
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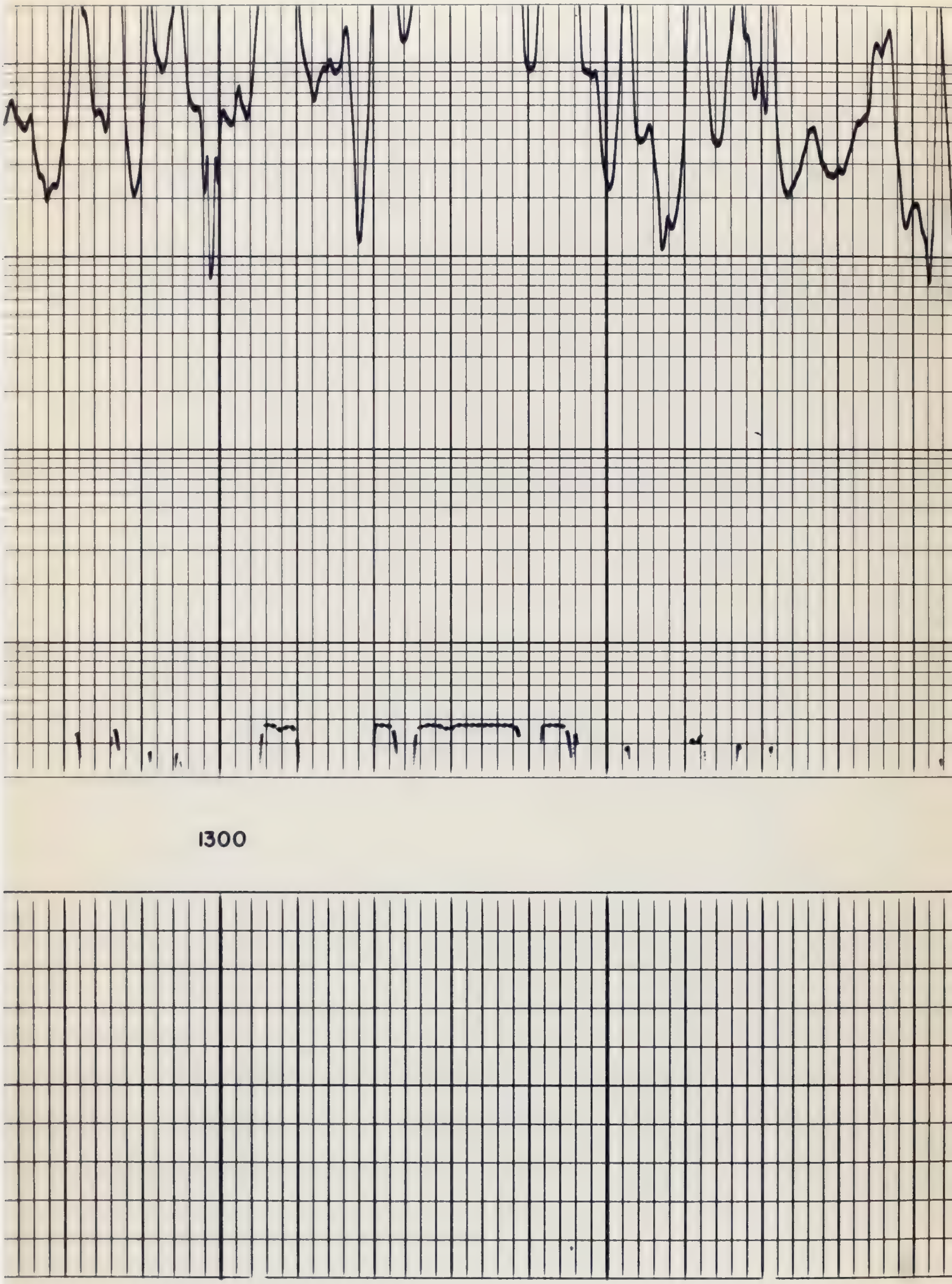
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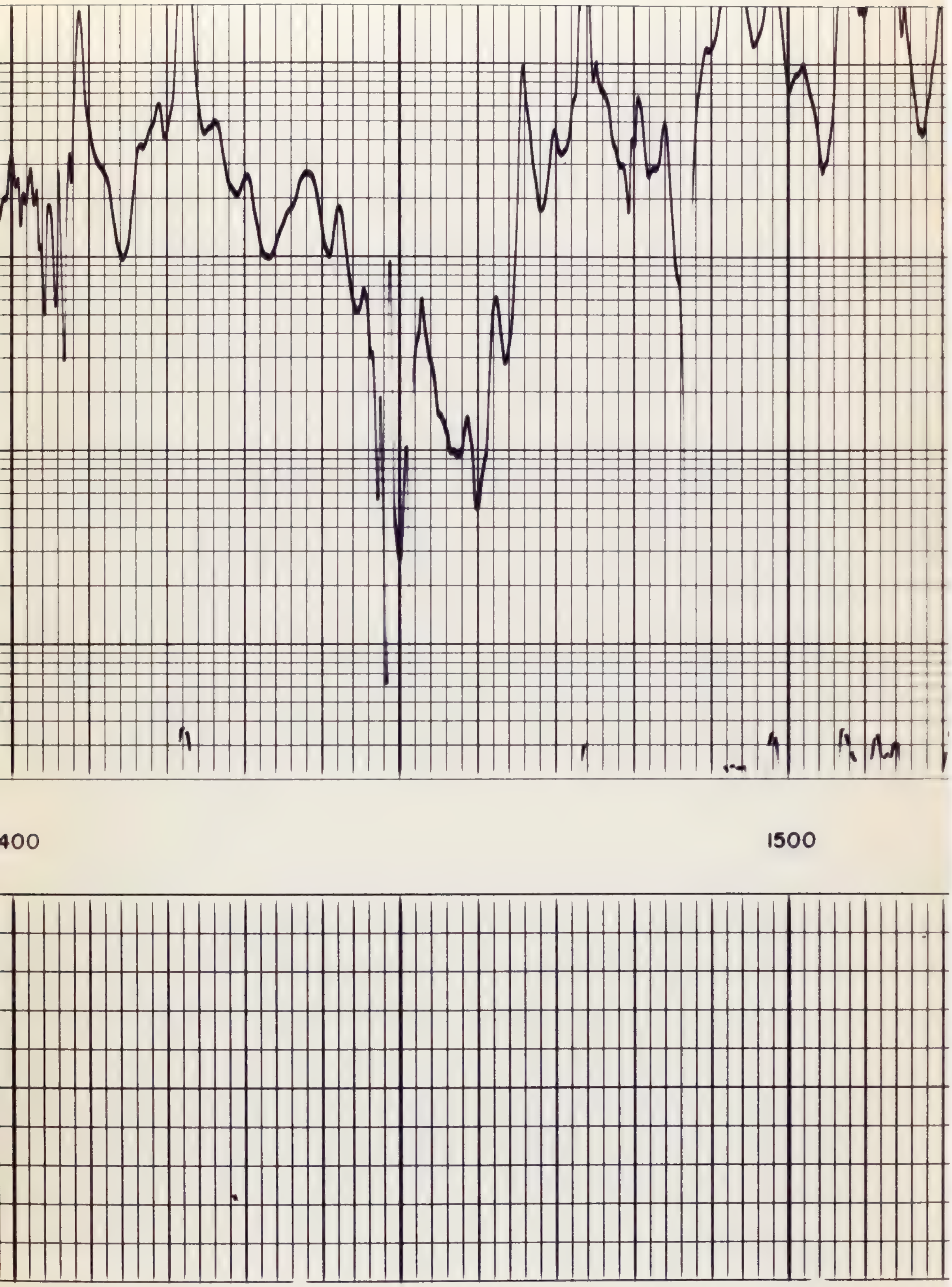
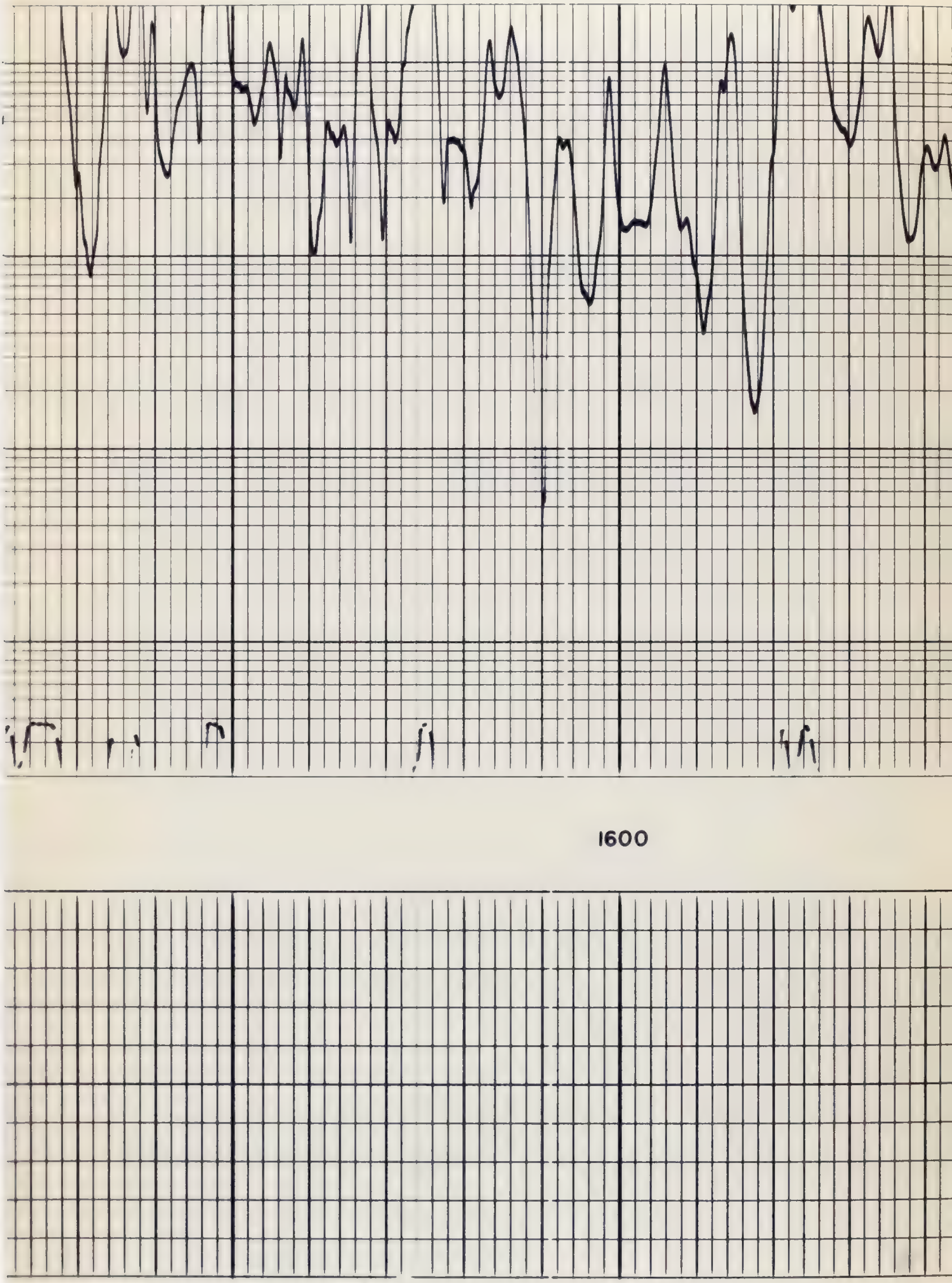

400
1500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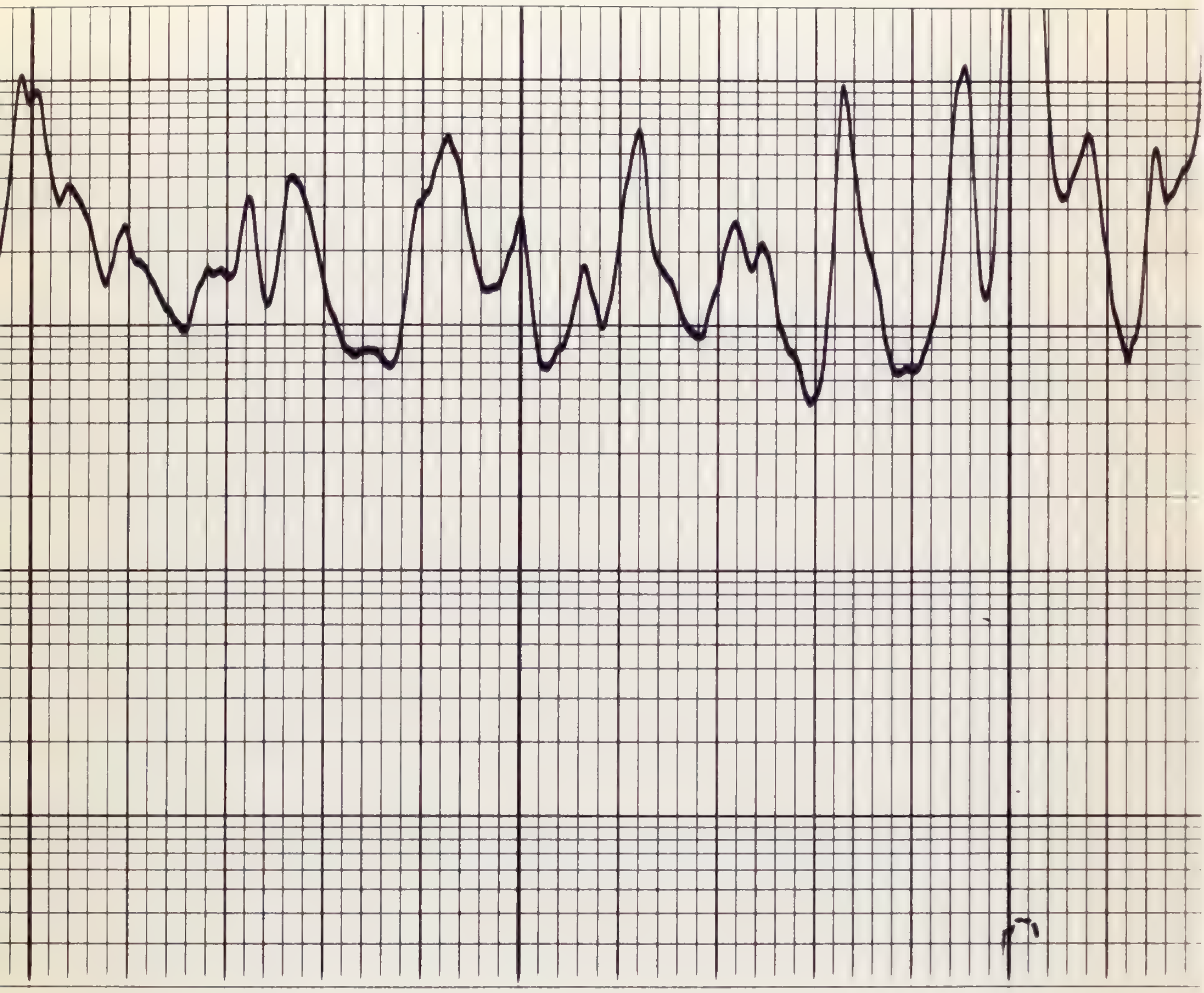
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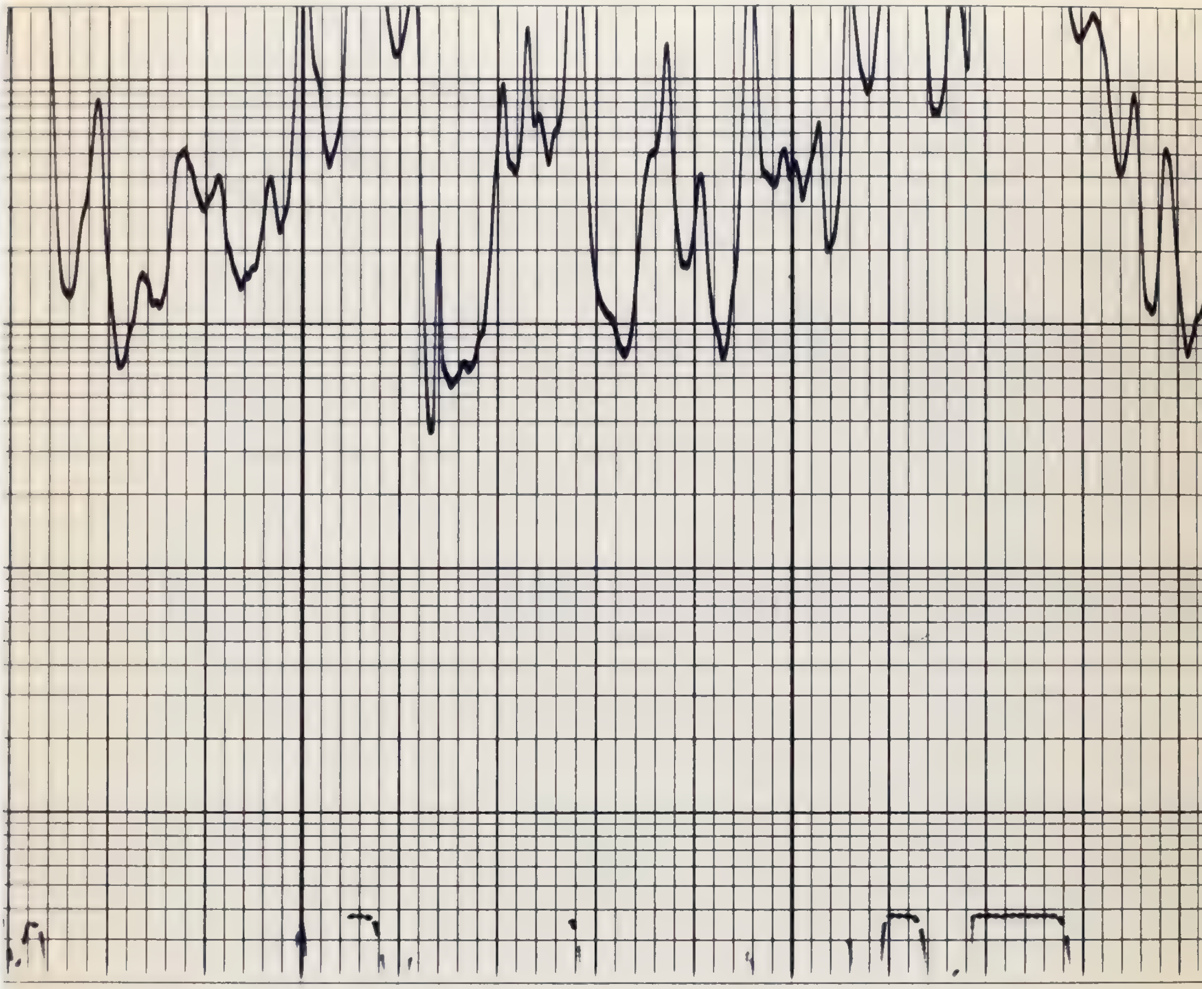

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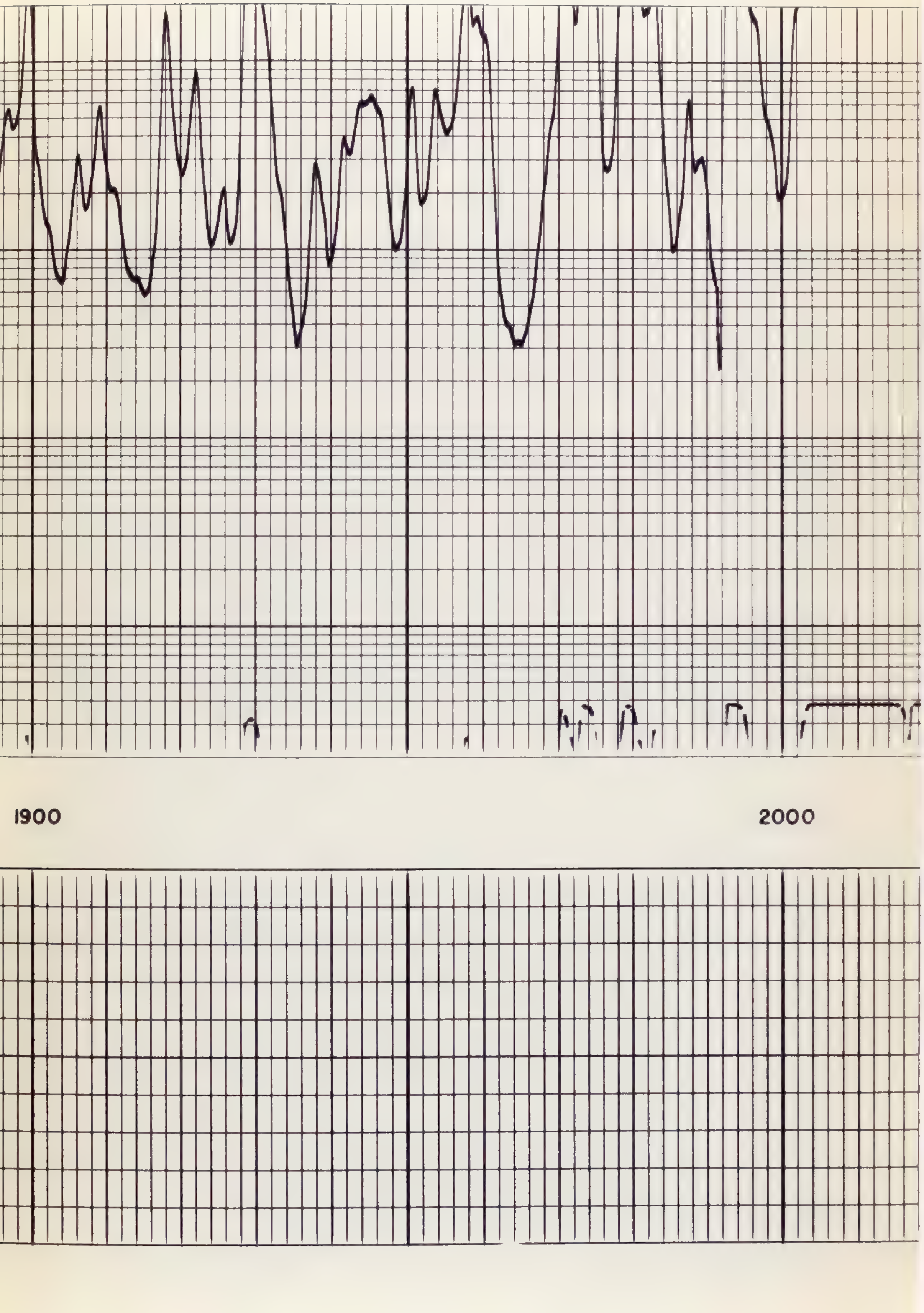
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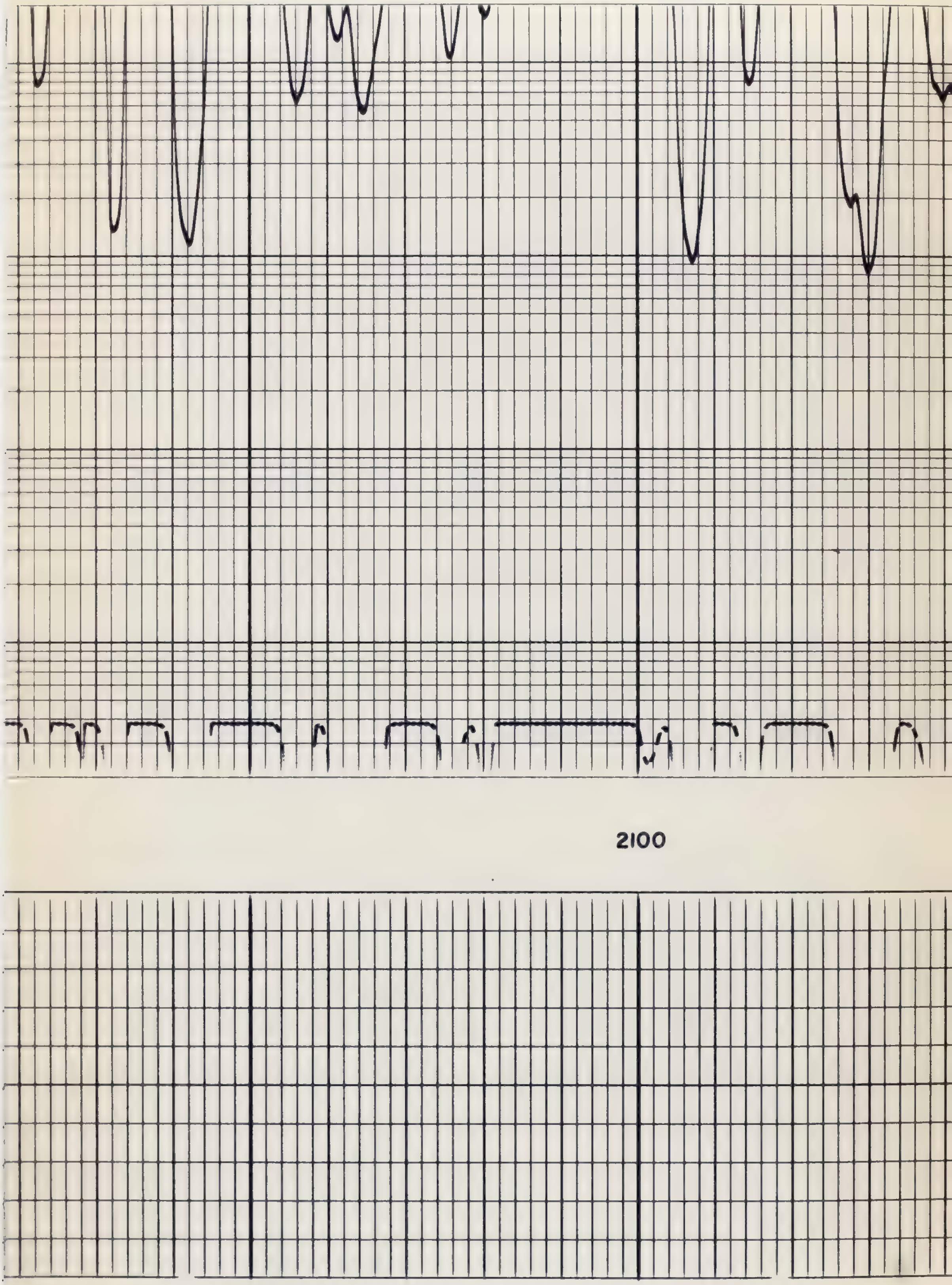
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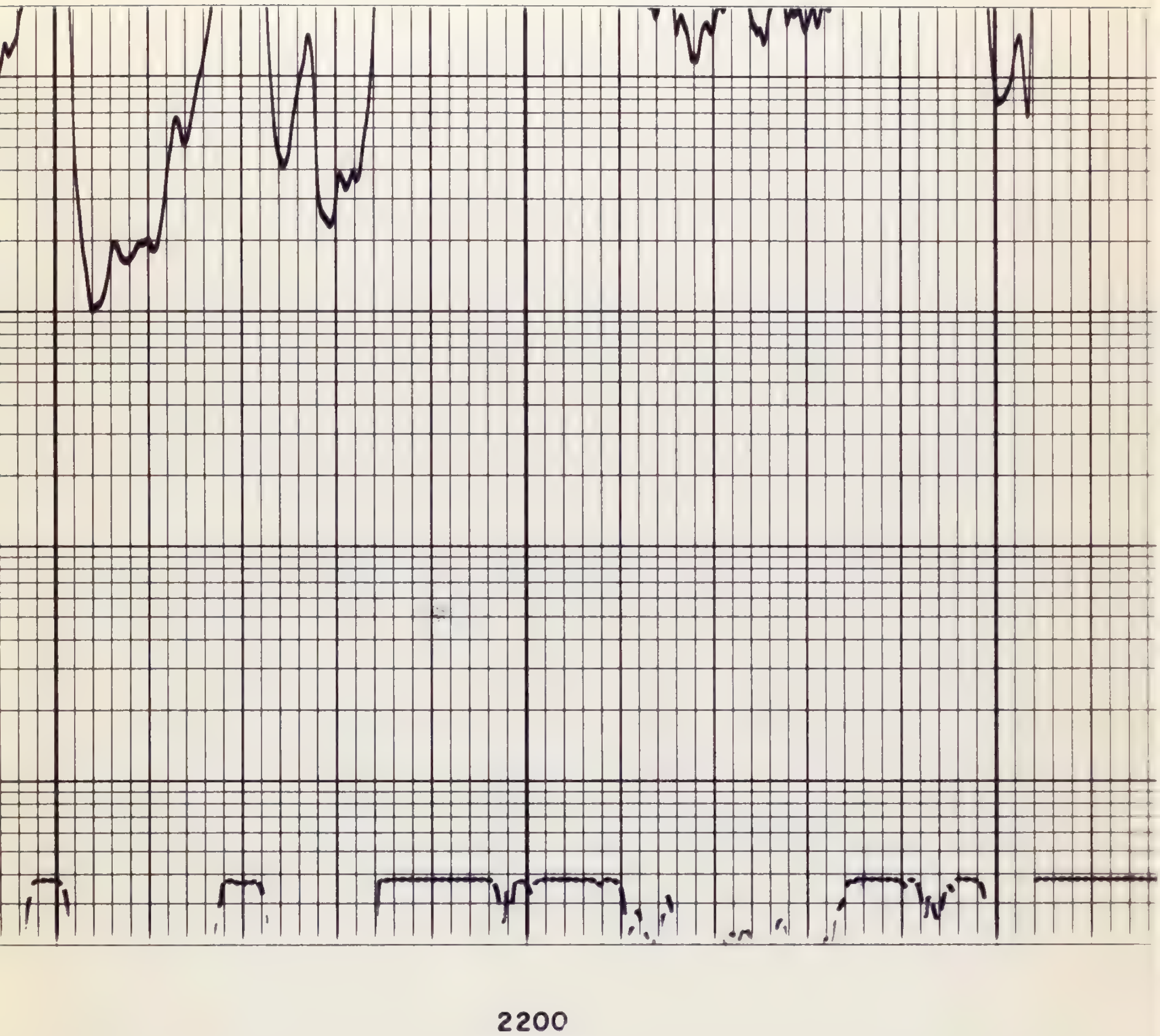
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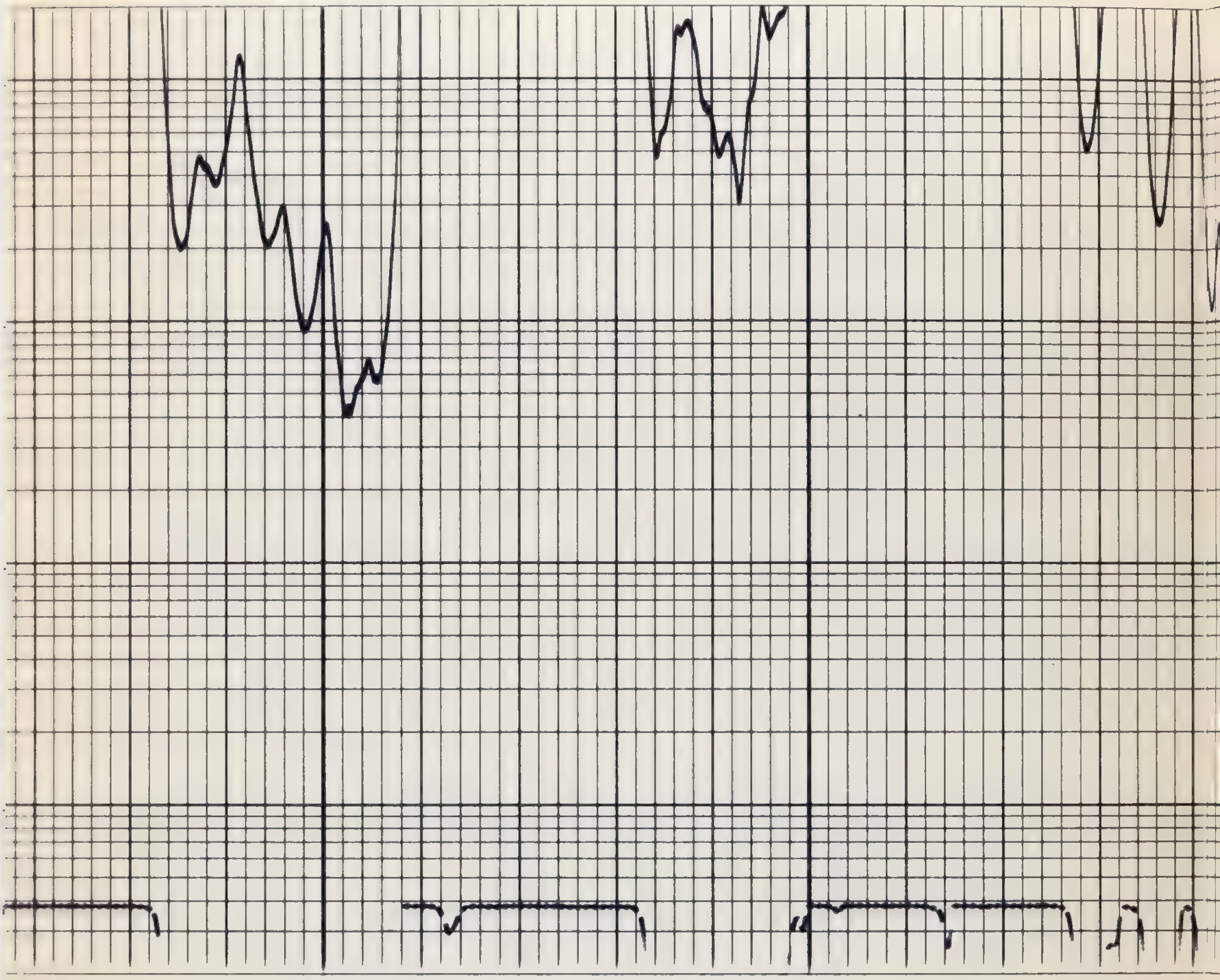

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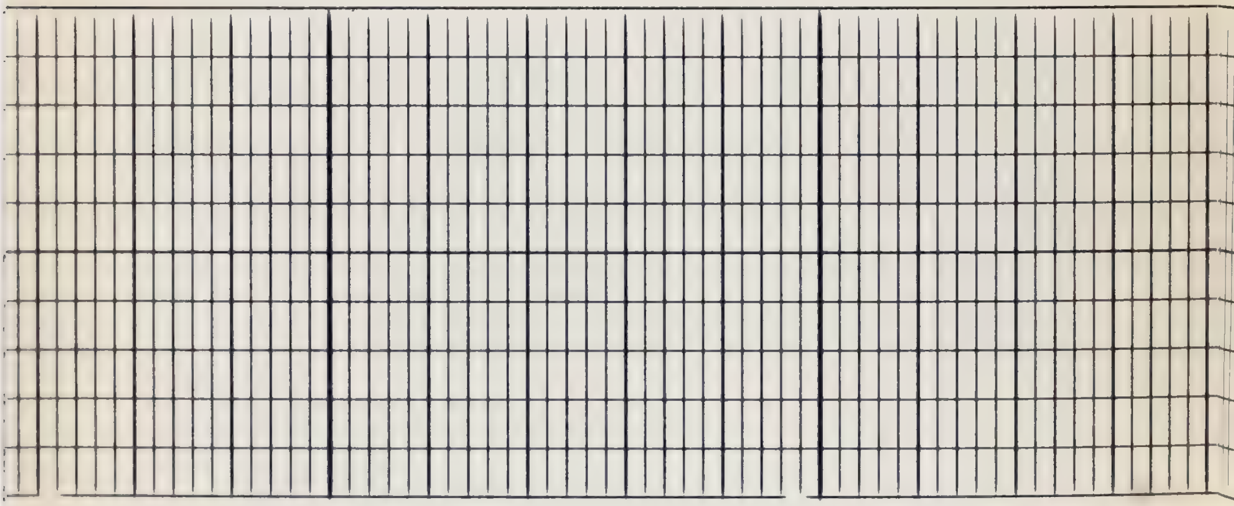

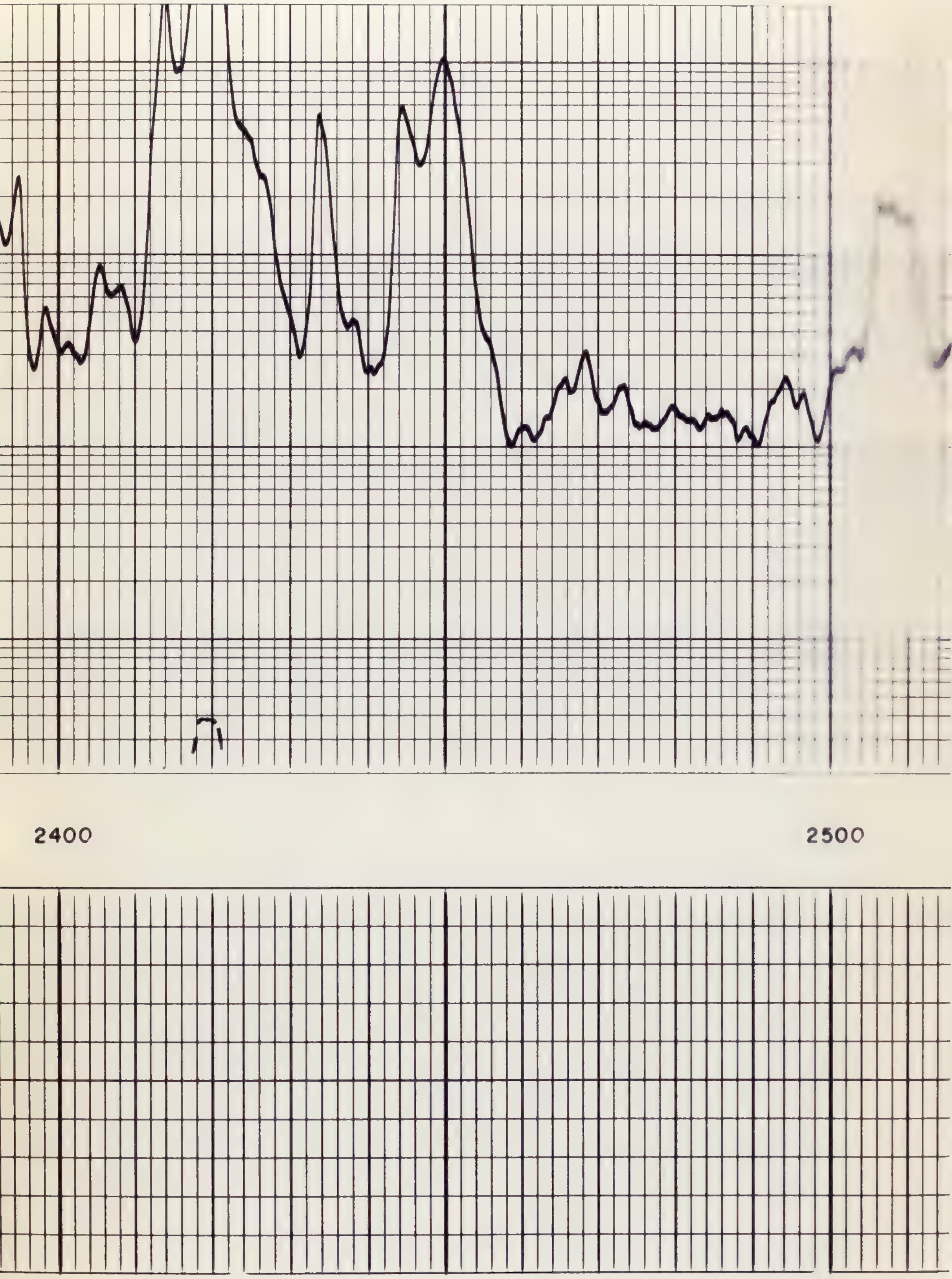
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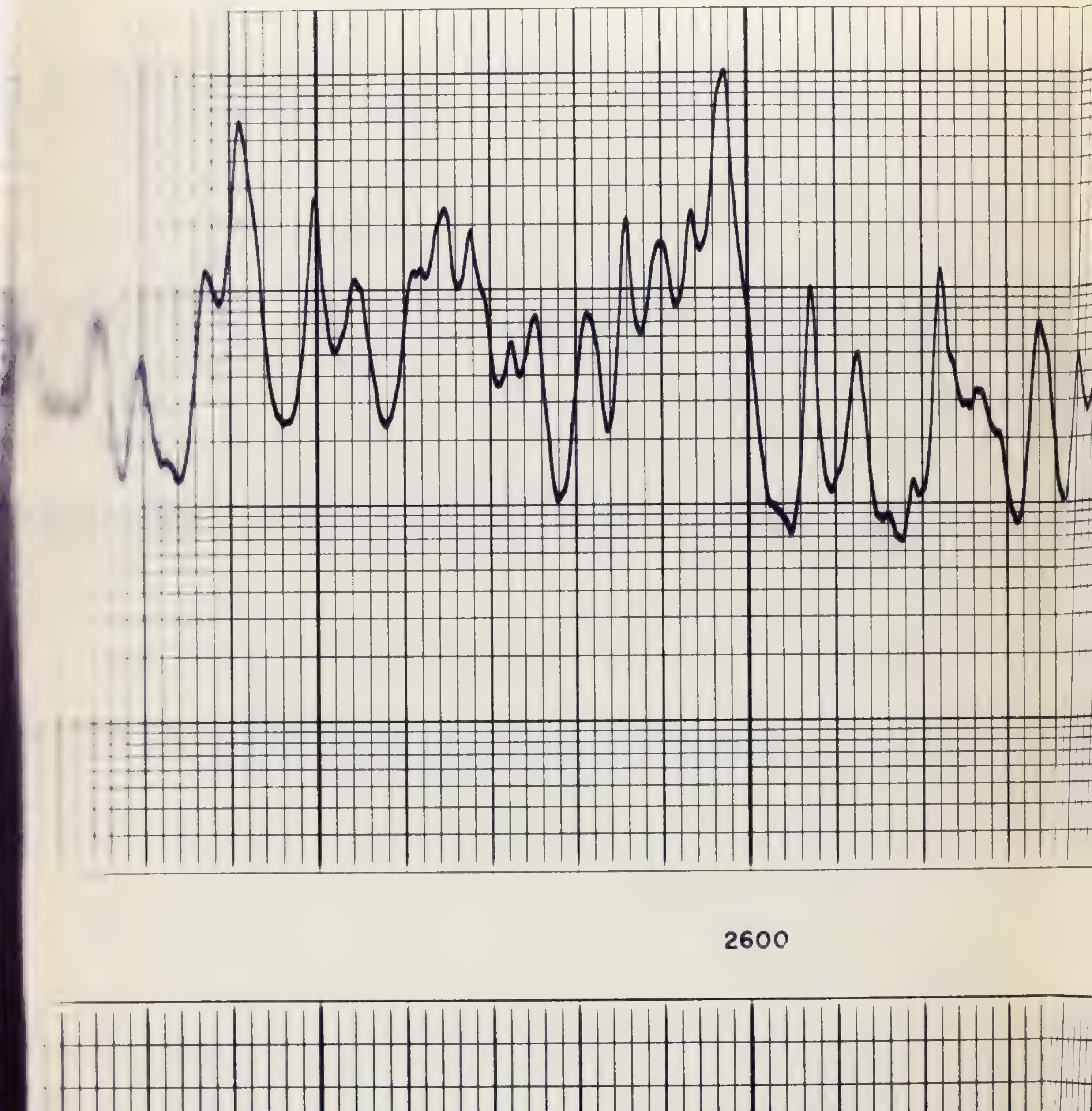

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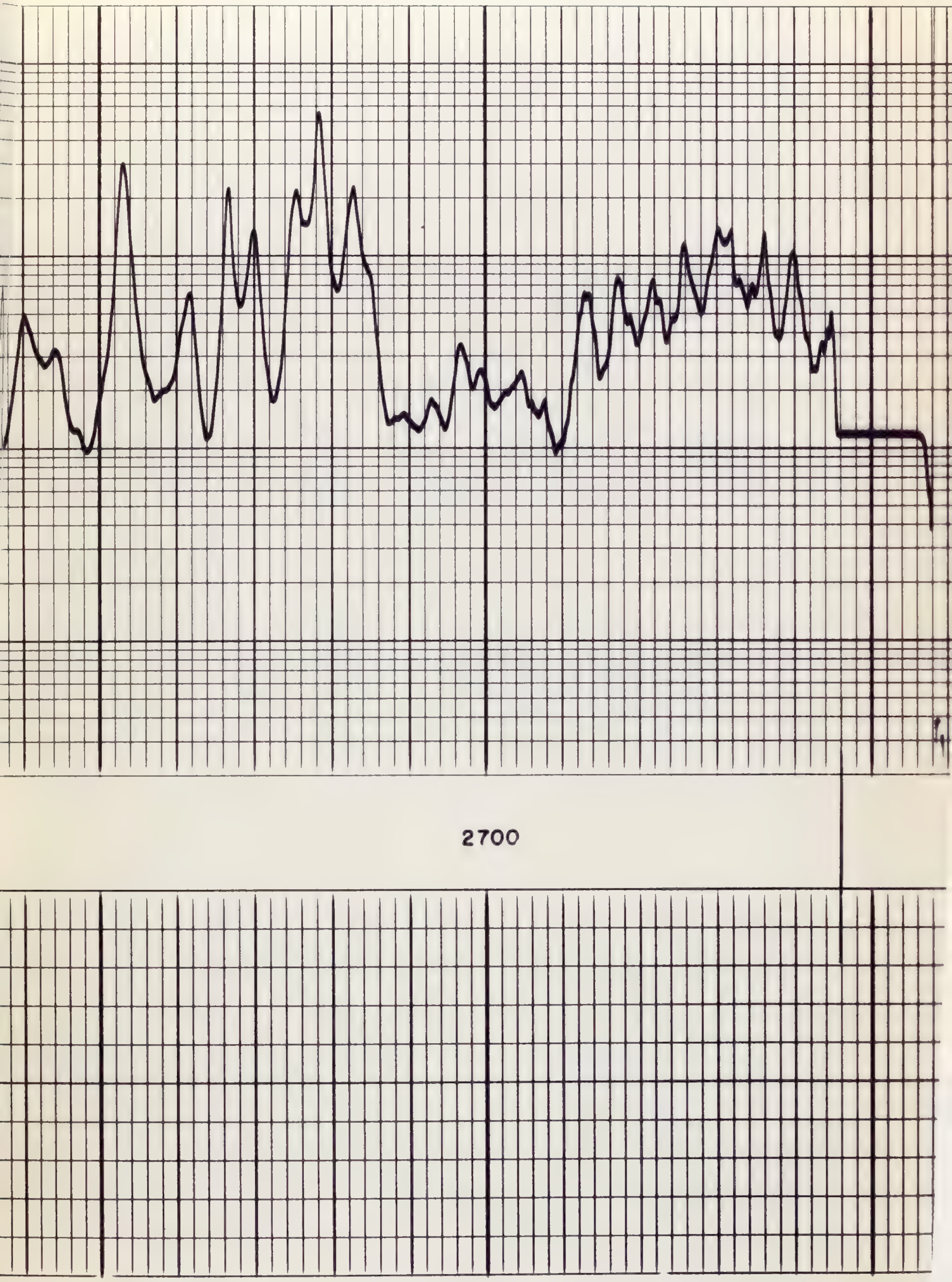
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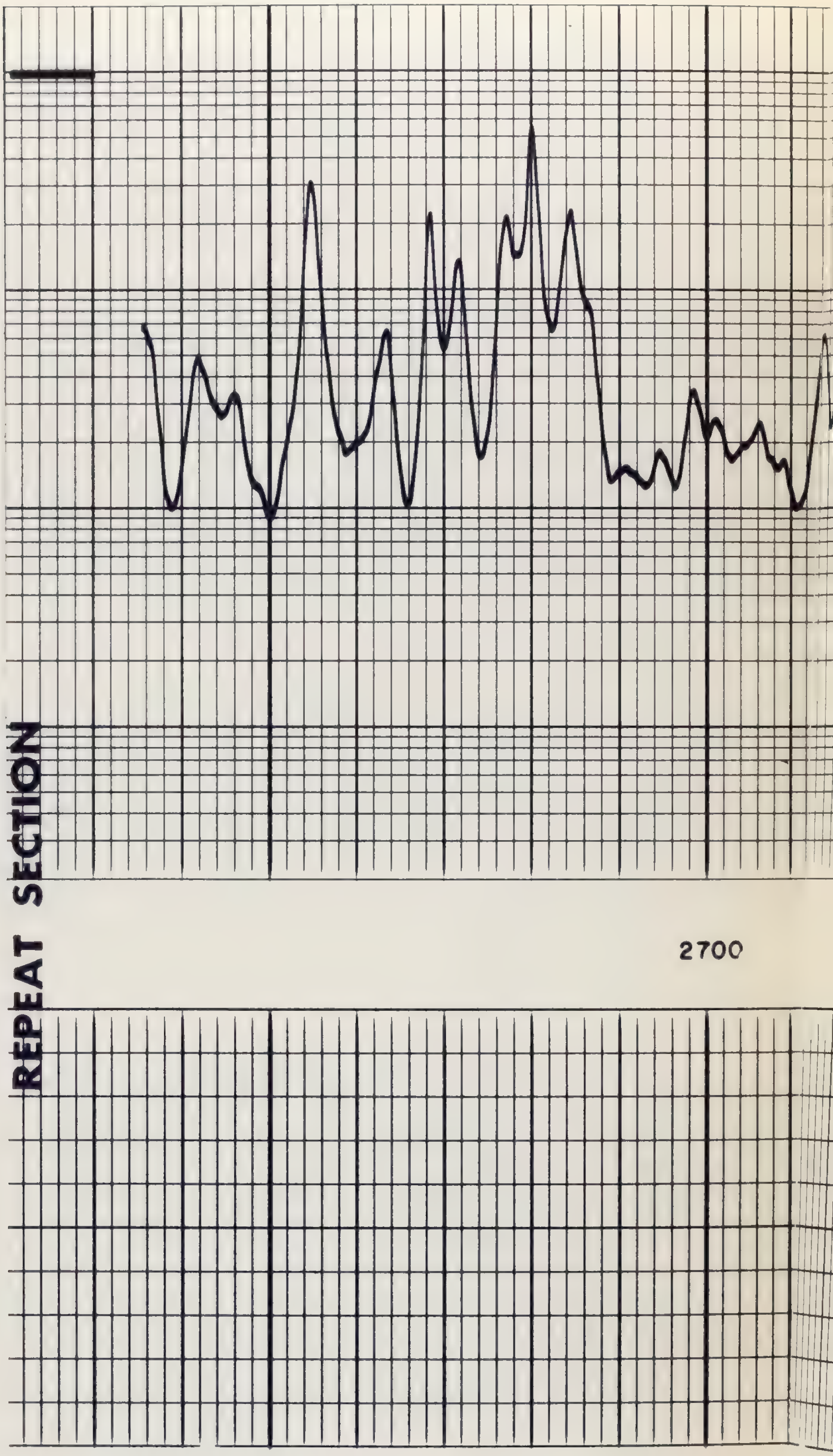
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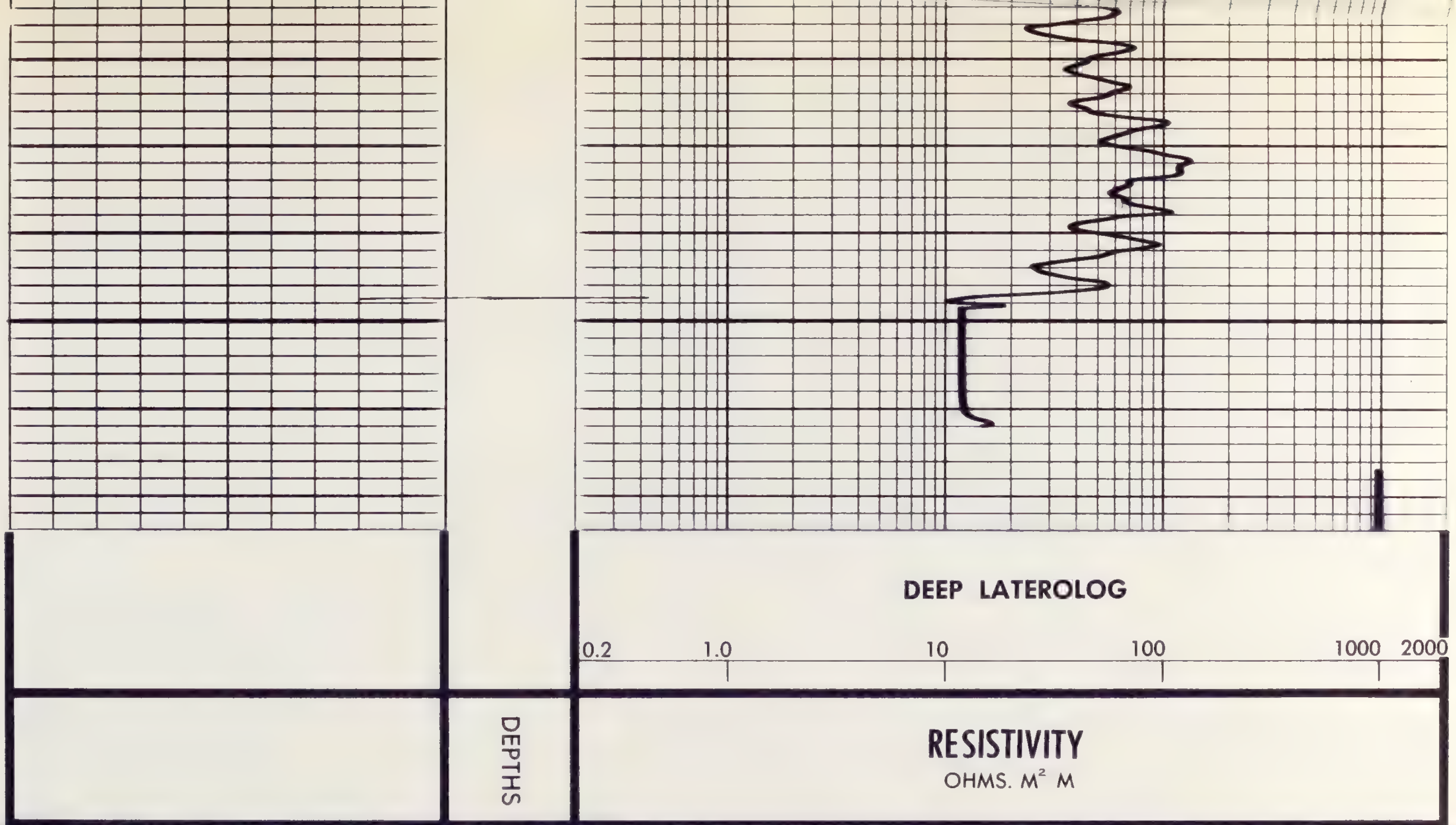
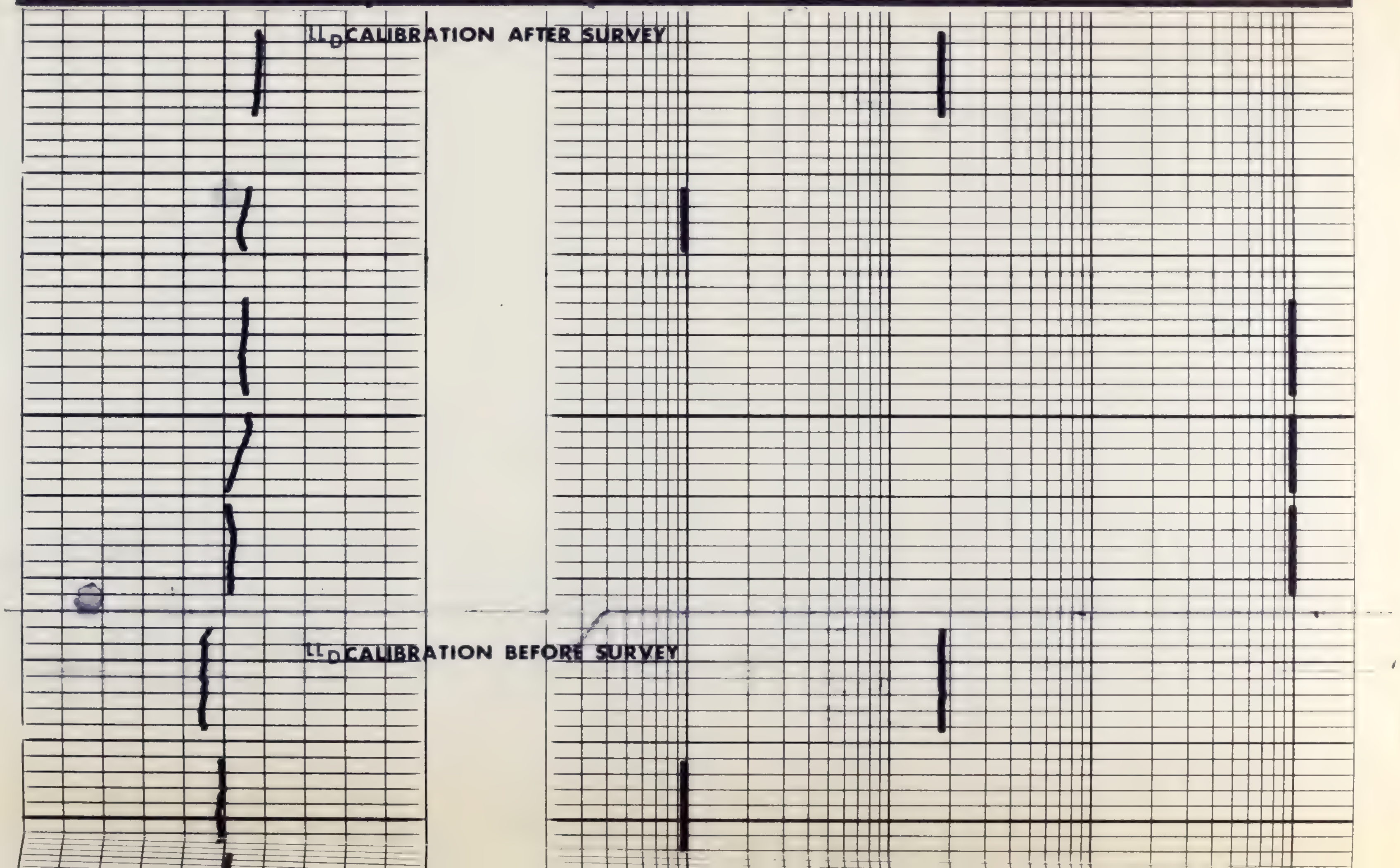
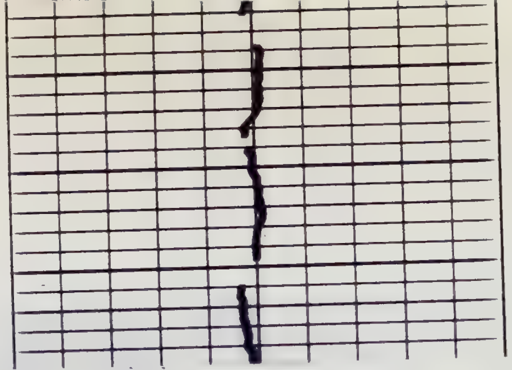
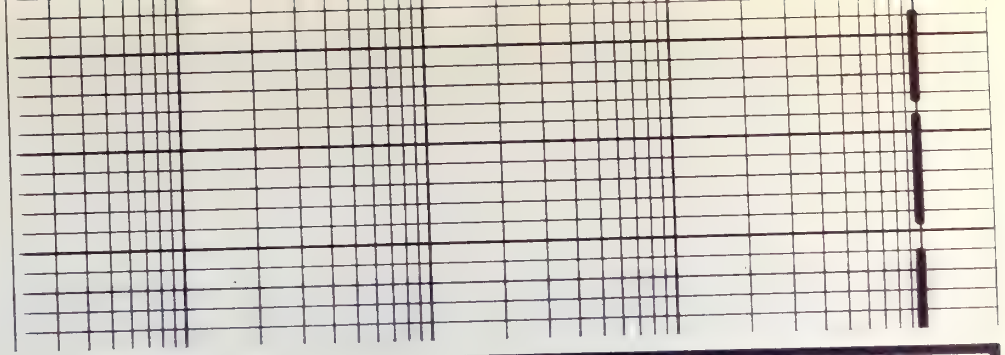


COMPANY	ATLANTIC RICHFIELD COMPANY	SCHL. FR 2744
WELL	S. G. NO. 9	SCHL. TD 2746
FIELD	SORGHUM GULCH	DRLR TD 2750
		Elev: KB 6878
		DF
RIO BLANCO	STATE COLORADO	GL 6870

CALIBRATION RECORD







CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHULM GULCH

COUNTY RIO BLANCO STATE COLORADO

SCHL. FR 2744
SCHL. TD 2746
DRLR TD 2750
Elev:
KB 6878
DF
GL 6870

SWS 1975-A

Schlumberger

COMPENSATED FORMATION DENSITY LOG
Gamma-Gamma

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL S. G. NO. 9
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.

Sec. 11 Twp. 3S Rge. 97W

Other Services:
BHC-GR
DIL
TEMP

Permanent Datum: GL ; Elev.: 6870
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 6878
D.F.
G.L. 6870

Date	10-24-74			
Run No.	ONE			
Depth—Driller	2750			
Depth—Logger	2740			
Btm. Log Interval	2739			
Top Log Interval	58			
Casing—Driller	7 @ 64	@	@	@
Casing—Logger	58			
Bit Size	6- /4			
Type Fluid in Hole	WATER & SOAP			
Fluid Level	472			
Dens. | Visc.				
pH | Fluid Los	ml	ml	ml	
Source of Sample	PIT			
R_m @ Meas. Temp.	5.12 @ 72 °F	5.54 @72 °F	5.51 @ 72 °F	@
R_{mf} @ Meas. Temp.	@ F	@ °F	@ F	@
R_{mc} @ Meas. Temp.	@ F	@ F	@ °F	@
Source: R_{mf} | R_{mc}				
R_m @ BHT	@ F	@ F	@ F	@
Time Since Circ.	30 HOURS			
Max. Rec. Temp.	132 F	F	°F	
Equip | Location	5602 | GJ			
Recorded By	BARGHOUTI			
Witnessed By	BURNS			

SWS 1381-H

FOLD HERE

The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.			
Depth - Driller				
Type Fluid				
Source of Sample				
R_m @ Meas. Temp.	@	°F	@	°F
R_{mf} @ Meas. Temp.	@	°F	@	°F
R_{mc} @ Meas. Temp.	@	°F	@	°F
R_m @ BHT	@	°F	@	°F
Dens. | Visc.				
ph | Fluid Loss		ml		ml
% Water by Vol.				
% Oil by Vol.				
% Solids by Vol.				
Solids Av. Sp. Gr.				

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Panel No.	FA-169			
Cart No.	FA-289			
Skid No.	D-688			
Sonde No.	E-90			
Source	B-3095			
Calibrator	106-210			
GR Cart.	G-289			
TTR				
Mem Panel	B-238			

LOGGING DATA

FDC Selectors

Liquid Density	Grain Density	Hole Fluid	Porosity Scale	From	To
1.00	2.71	LIQ.		TD	472
.90	2.71	AIR		47	CSG

BIT SIZE CASING DATA

Bit	From	To	Csg. Size	Csg. Wt.	From	To
6 /4	2750	TD	7		SURF	64

REMARKS

Service Order No. - 22425

CALIBRATION DATA

Run No.	Gamma Ray			FDC — Before Log — ACPS		FDC — After Log — ACPS	
	API Scale	Background CPS	Total CPS	P_1	P_2	P_1	P_2
1	0-150	90	530	544	880	544	880
2							
3							
4							

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CALIPER

HOLE DIAM. IN INCHES

6 16

DEPTHS

.25 0 .25

CORRECTION

GRAMS/CC.

GAMMA RAY

API UNITS

0 150

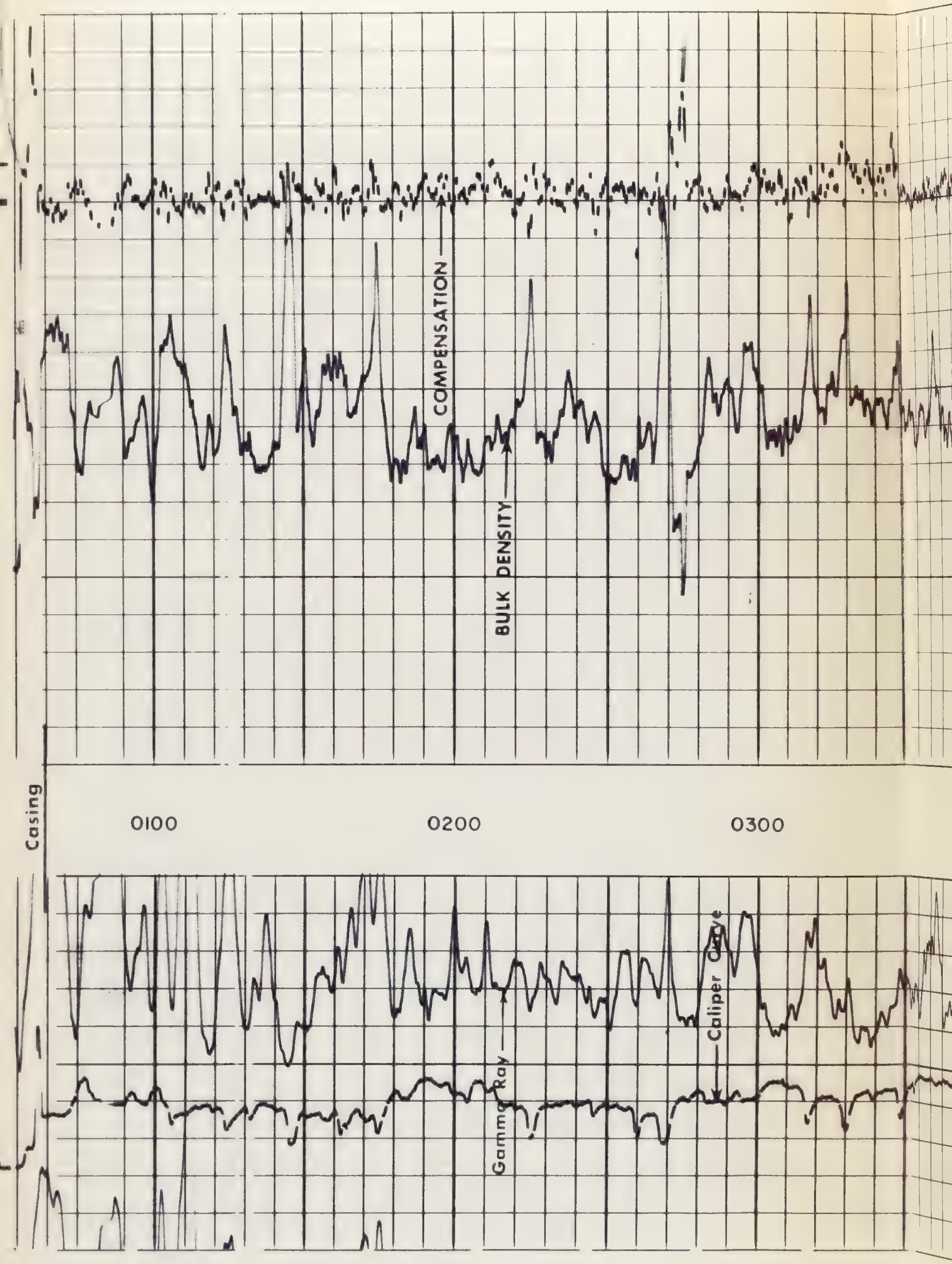
150 300

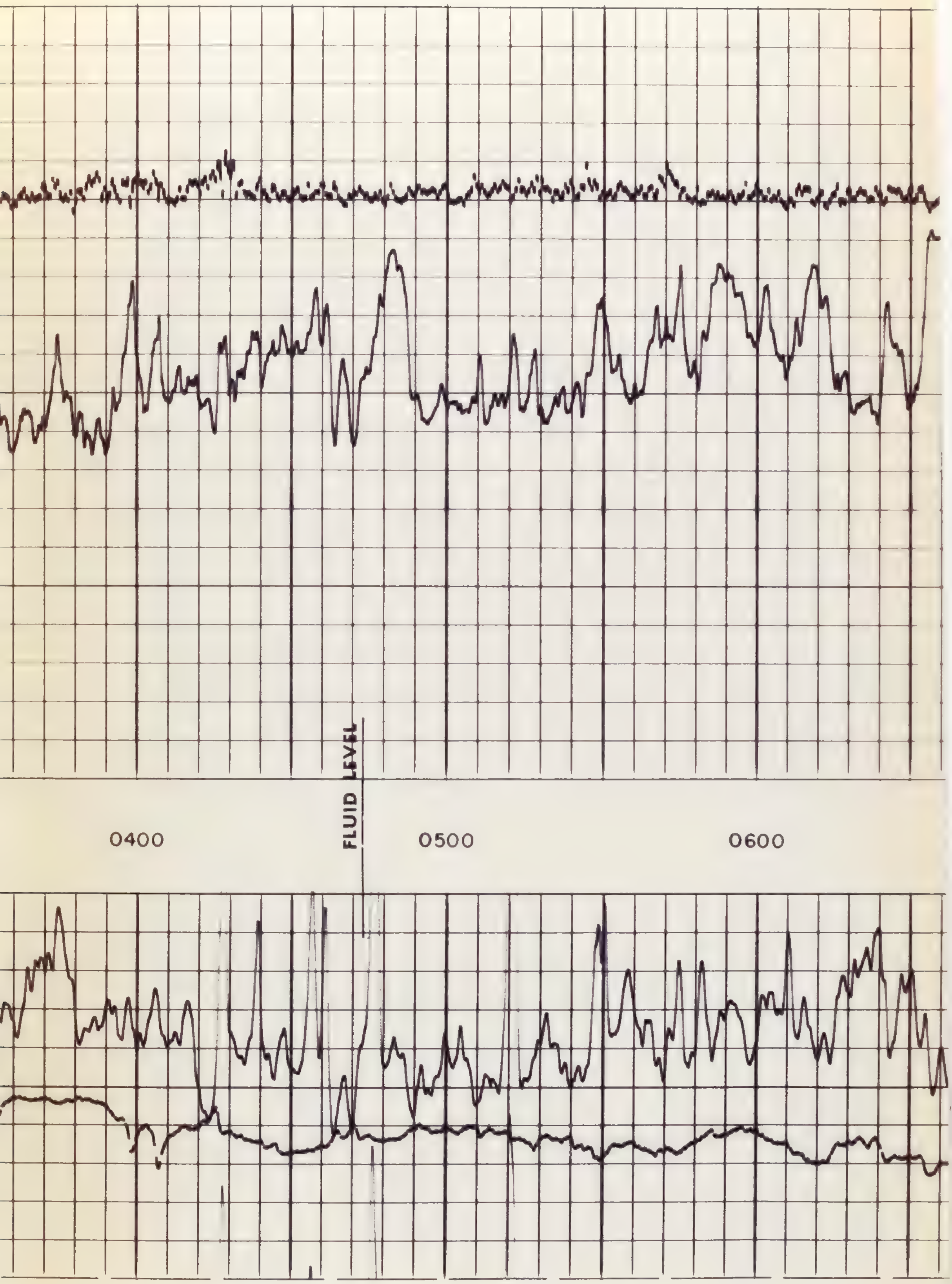
BULK DENSITY

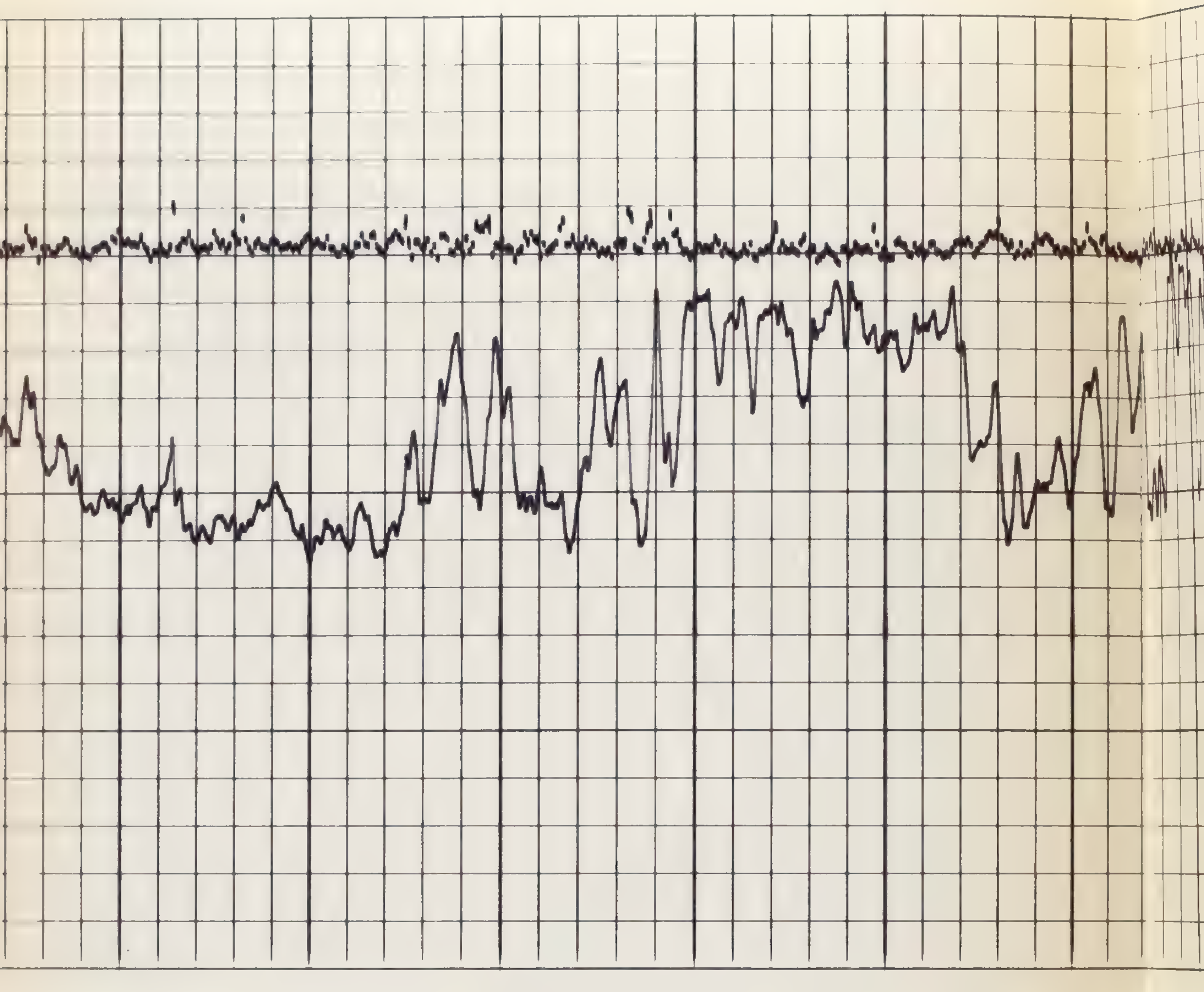
GRAMS CC.

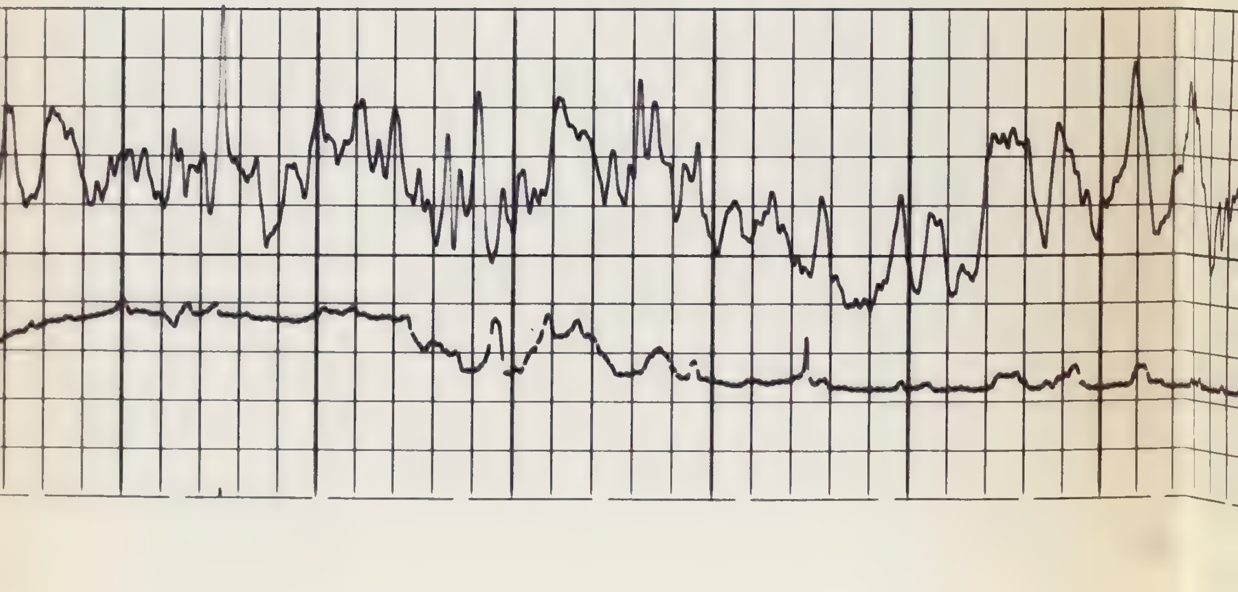
1.7 2.2 2.7

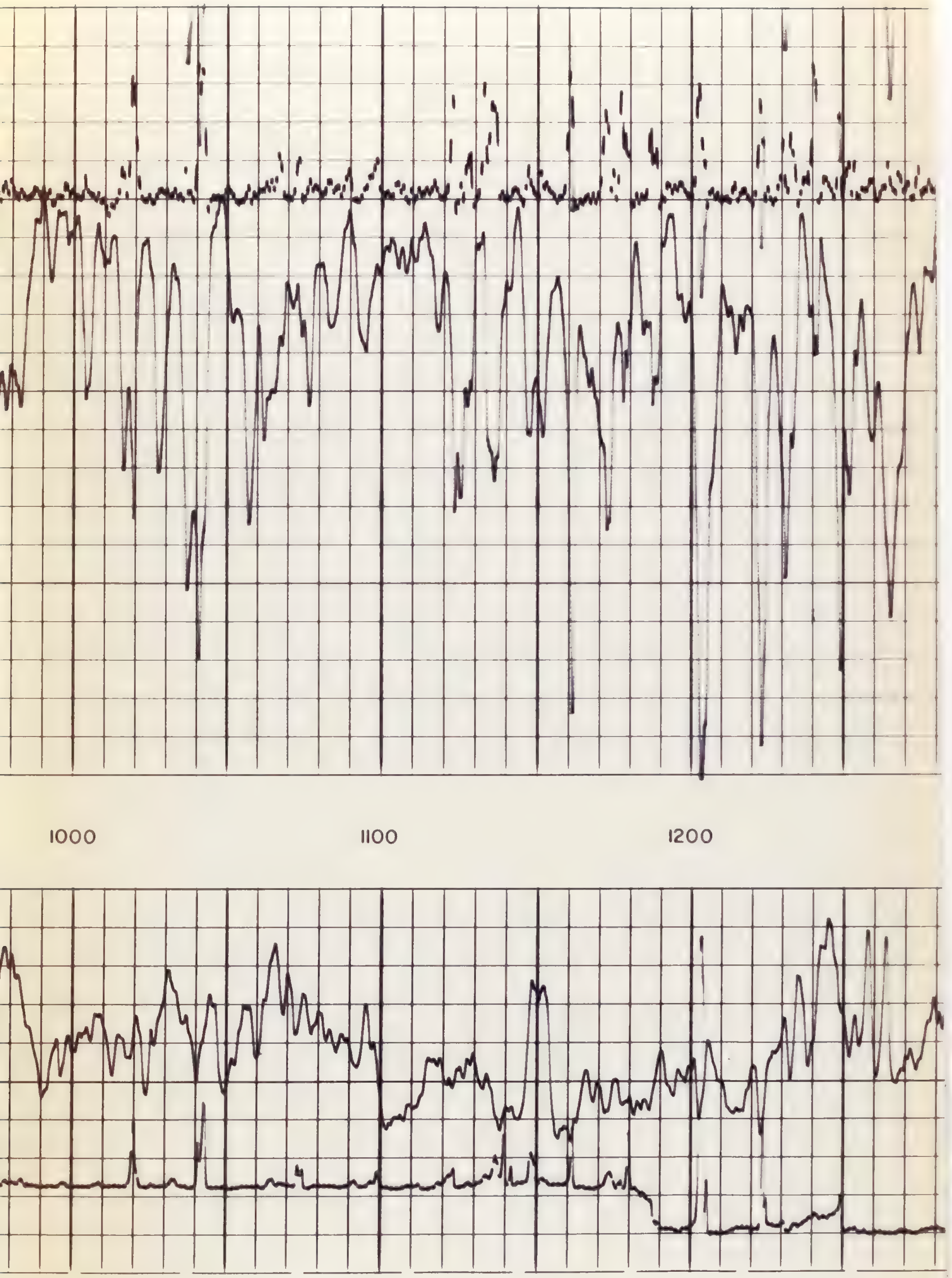
.7 1.2 1.7

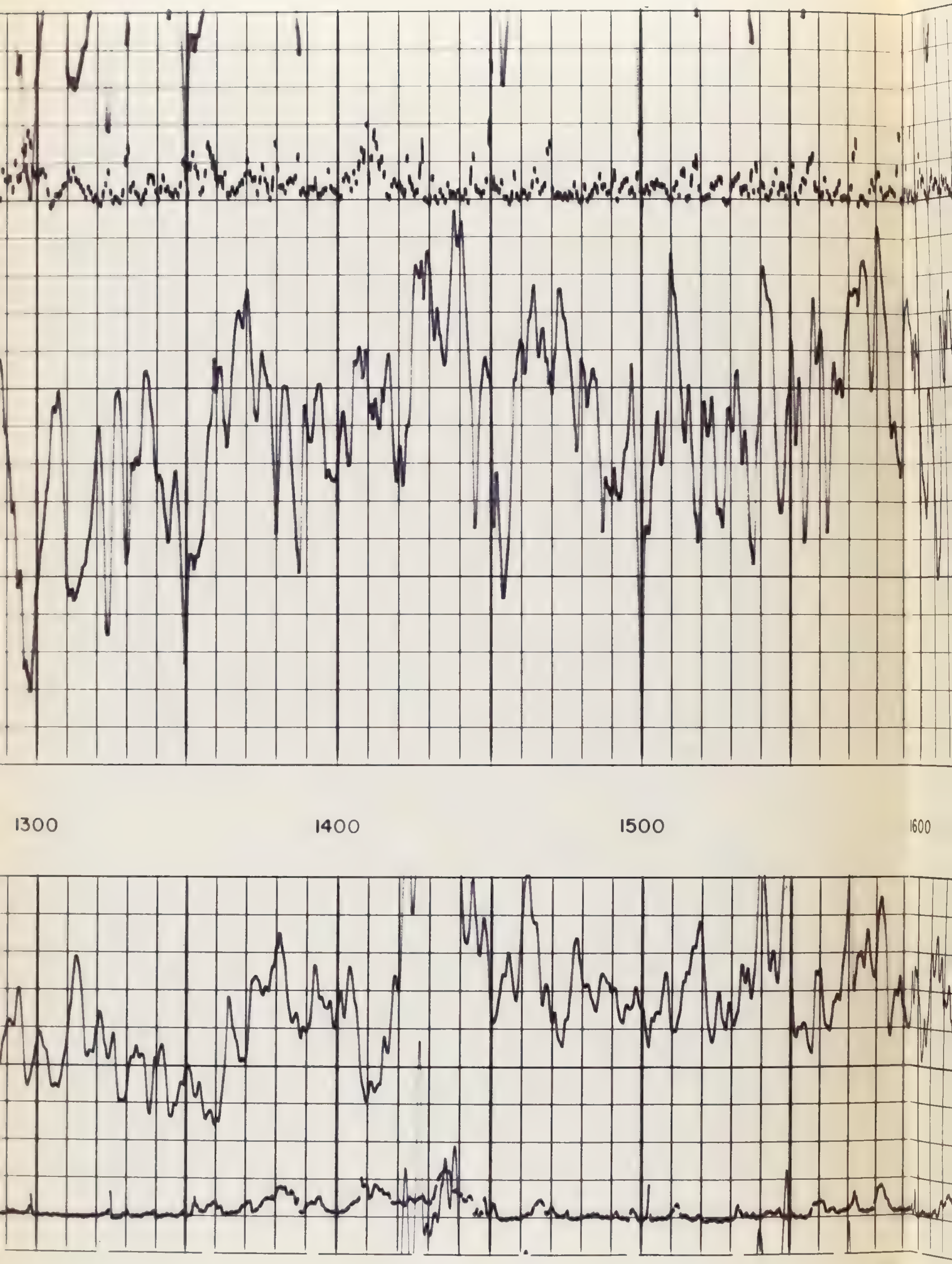

COMPENSATION
BULK DENSITY
Casing
0100
0200
0300
Gamma Ray
Caliper Curve

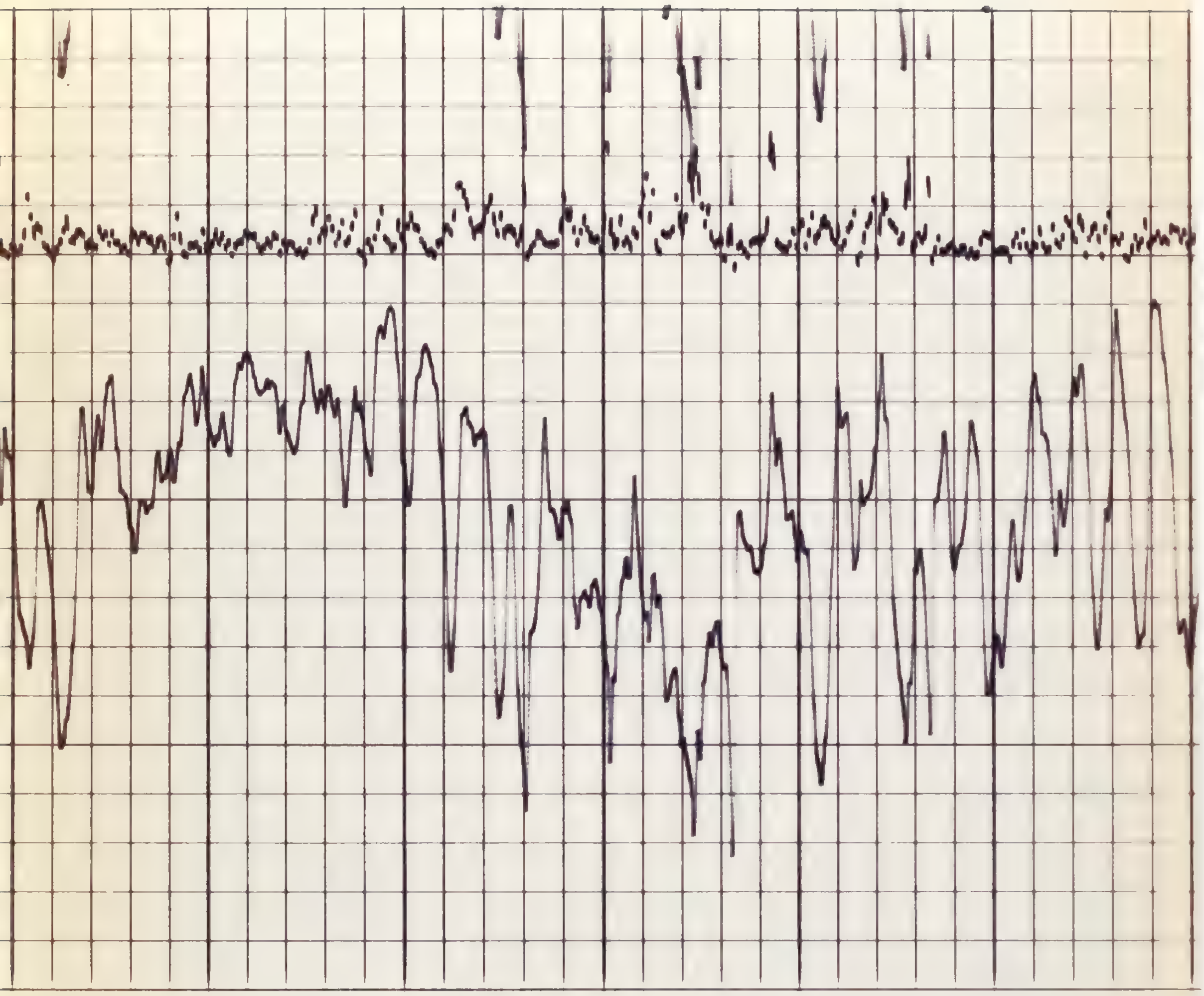

0400
FLUID LEVEL
0500
0600


0700
0800
0900
100

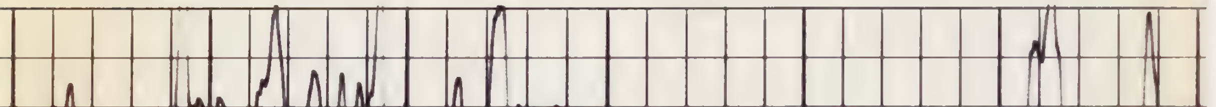


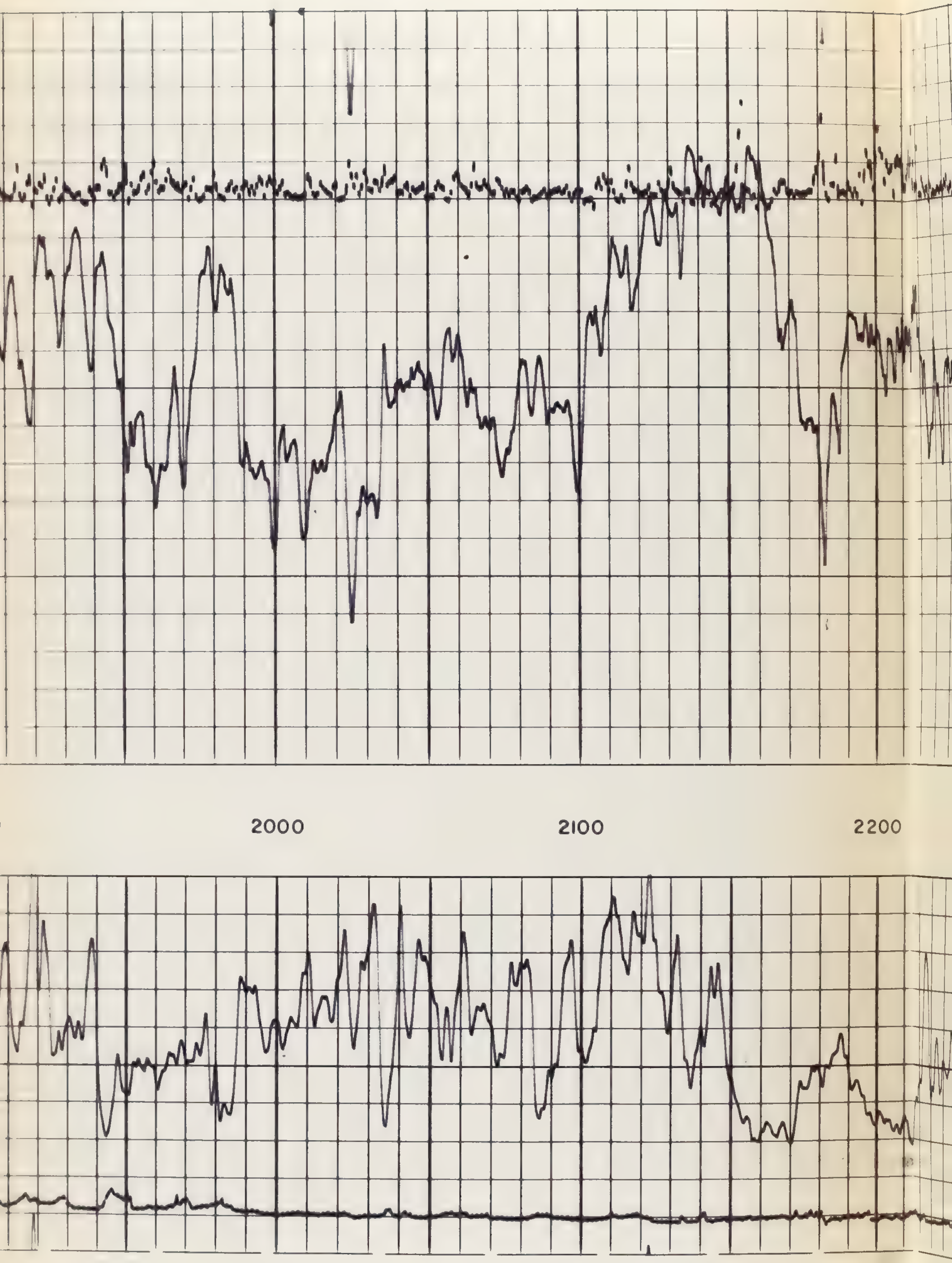

1000
1100
1200

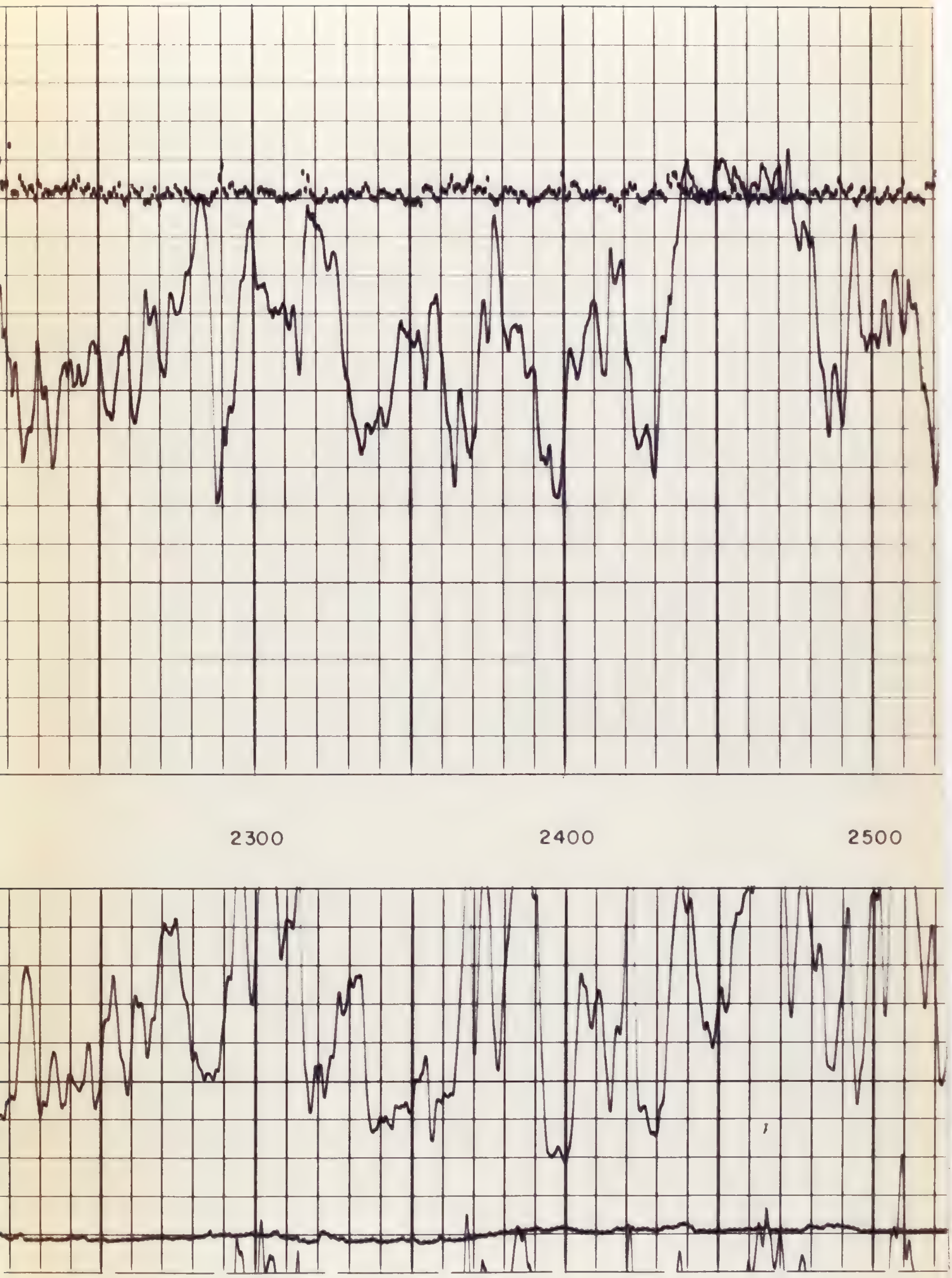

1300
1400
1500
1600

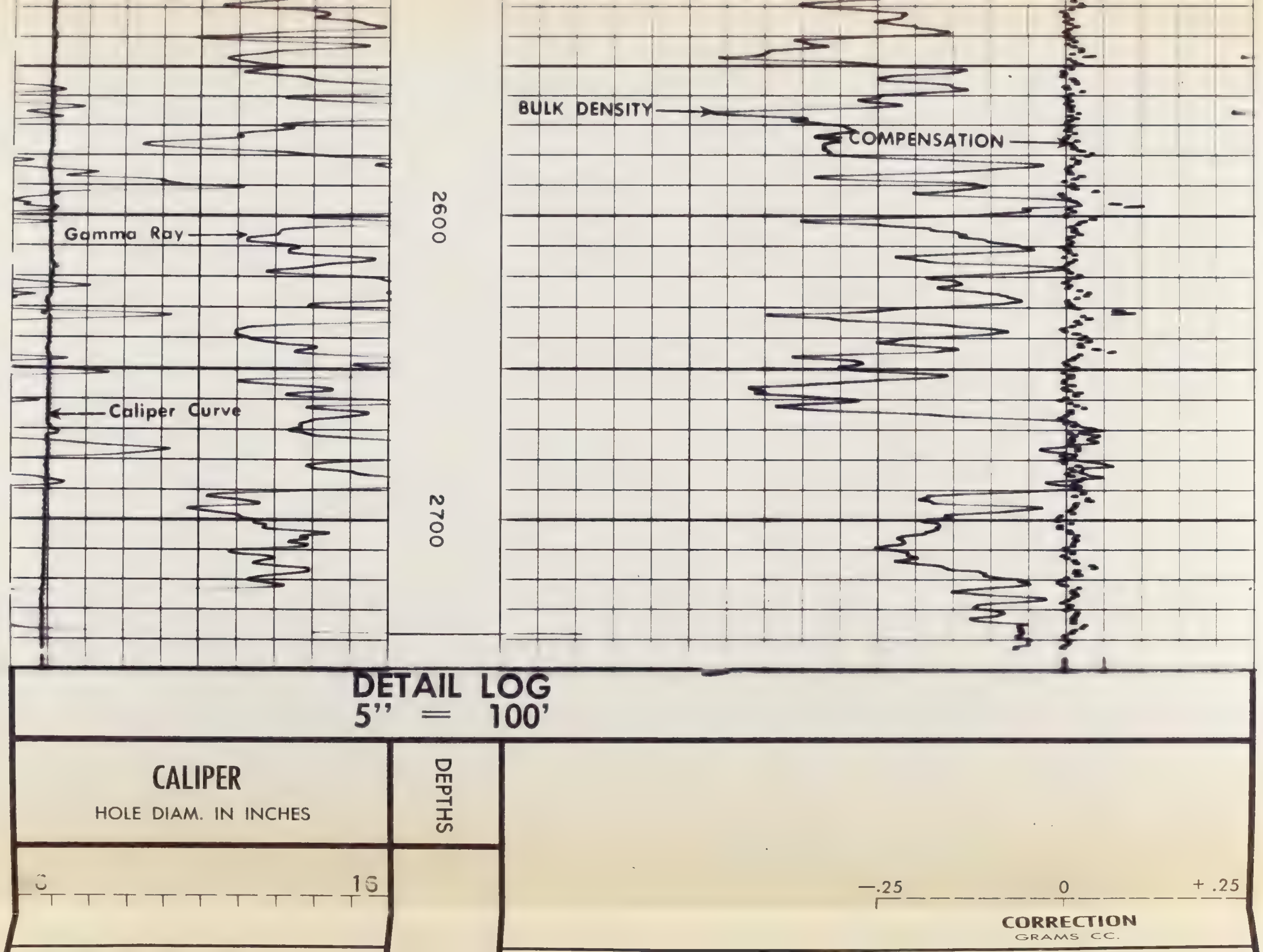


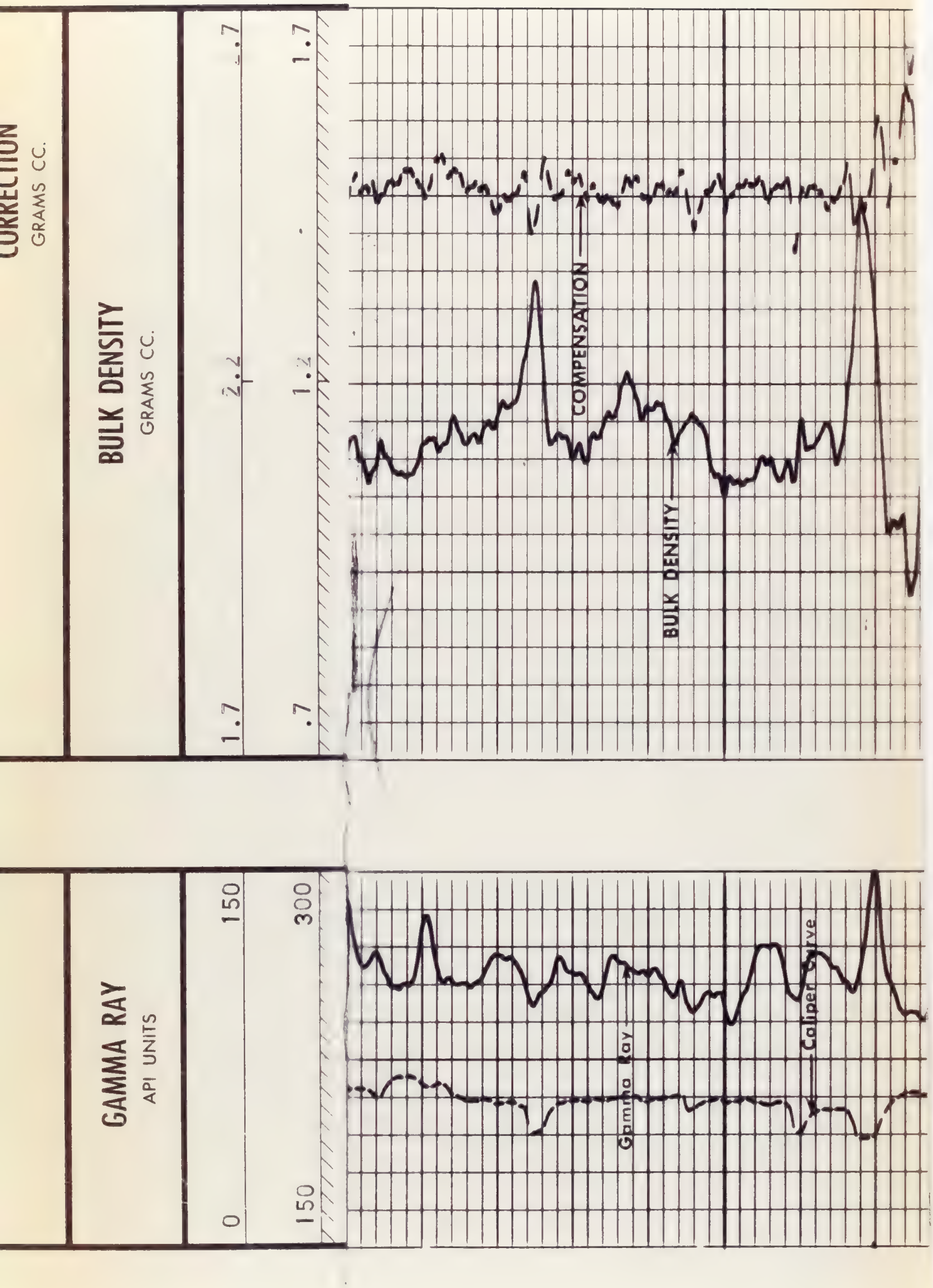
500
1700
1800
19C

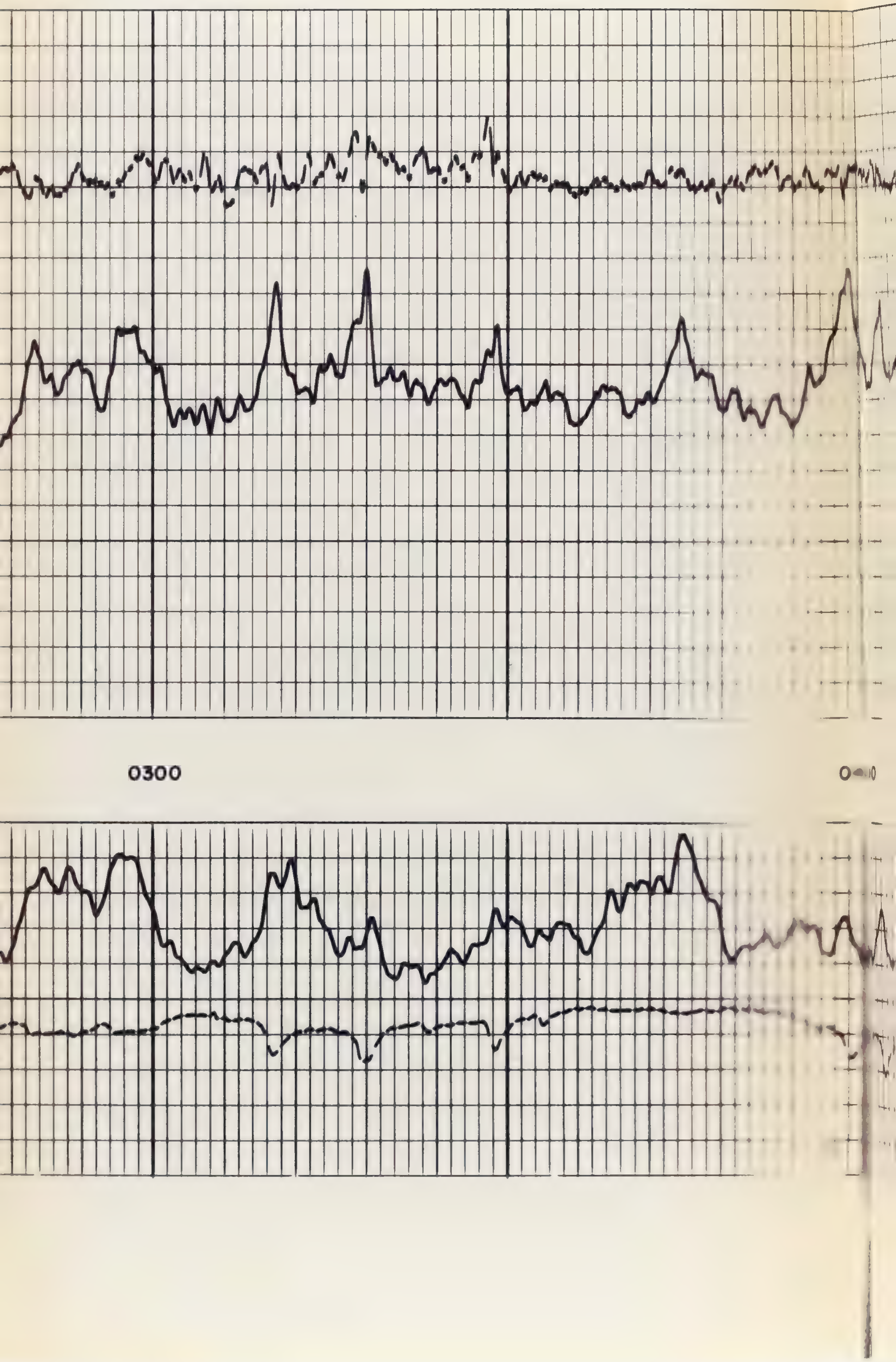



2000
2100
2200


2300
2400
2500


BULK DENSITY
COMPENSATION
Gamma Ray
Caliper Curve
2600
2700
DETAIL LOG
5" = 100'
CALIPER
HOLE DIAM. IN INCHES
6
16
DEPTHS
−.25
0
+ .25
CORRECTION
GRAMS CC.

CORRECTION
GRAMS CC.
BULK DENSITY
GRAMS CC.
1.7
2.2
1.7
.7
1.2
1.7
COMPENSATION
BULK DENSITY
GAMMA RAY
API UNITS
0
150
150
300
Gamma Ray
Caliper Curve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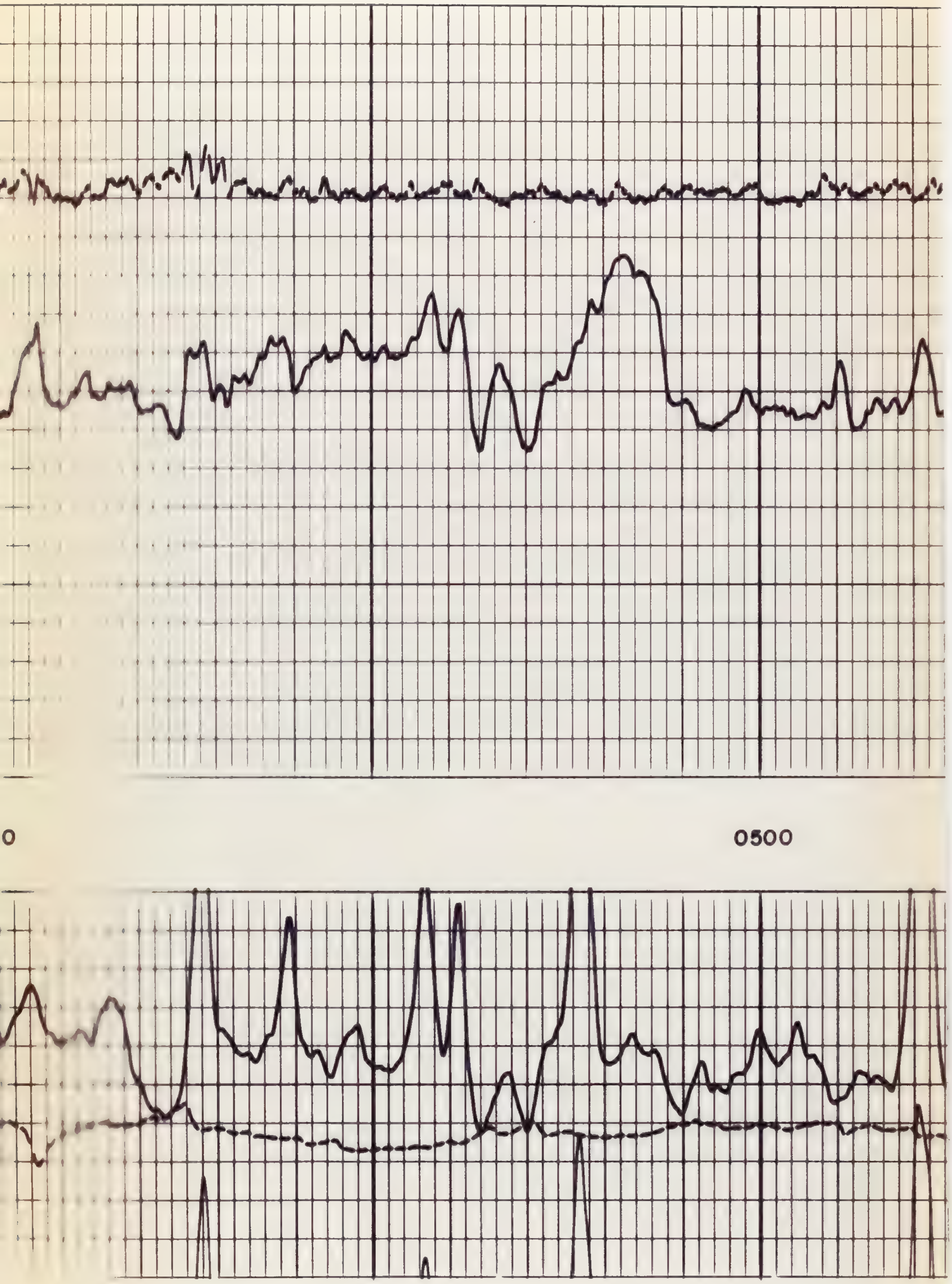
0400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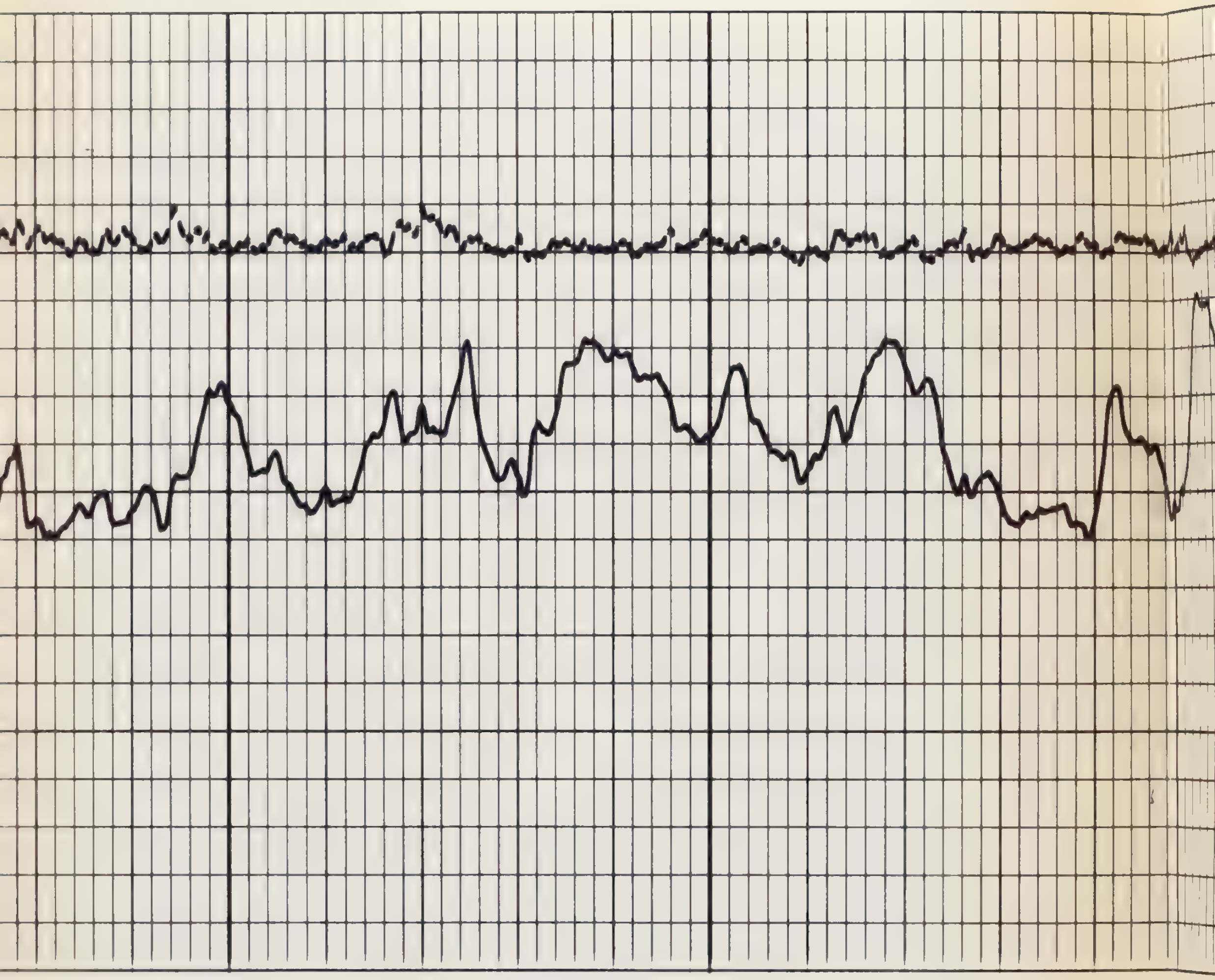
0500



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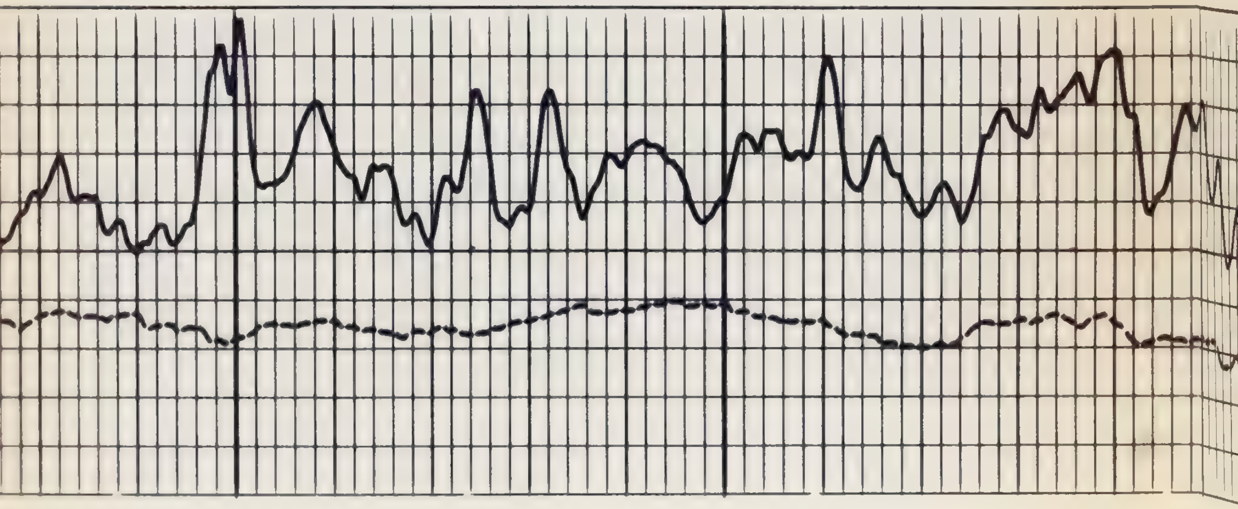

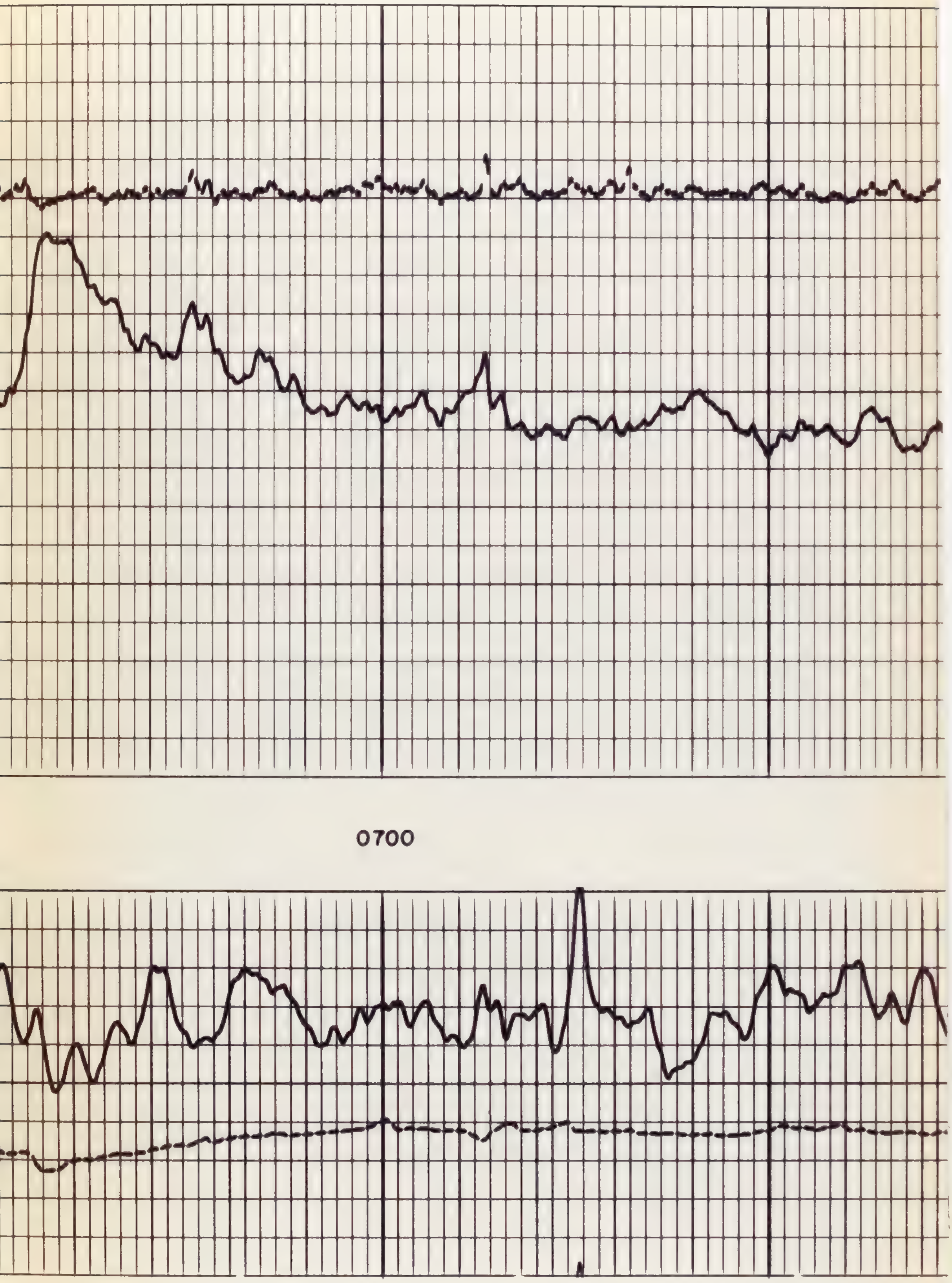
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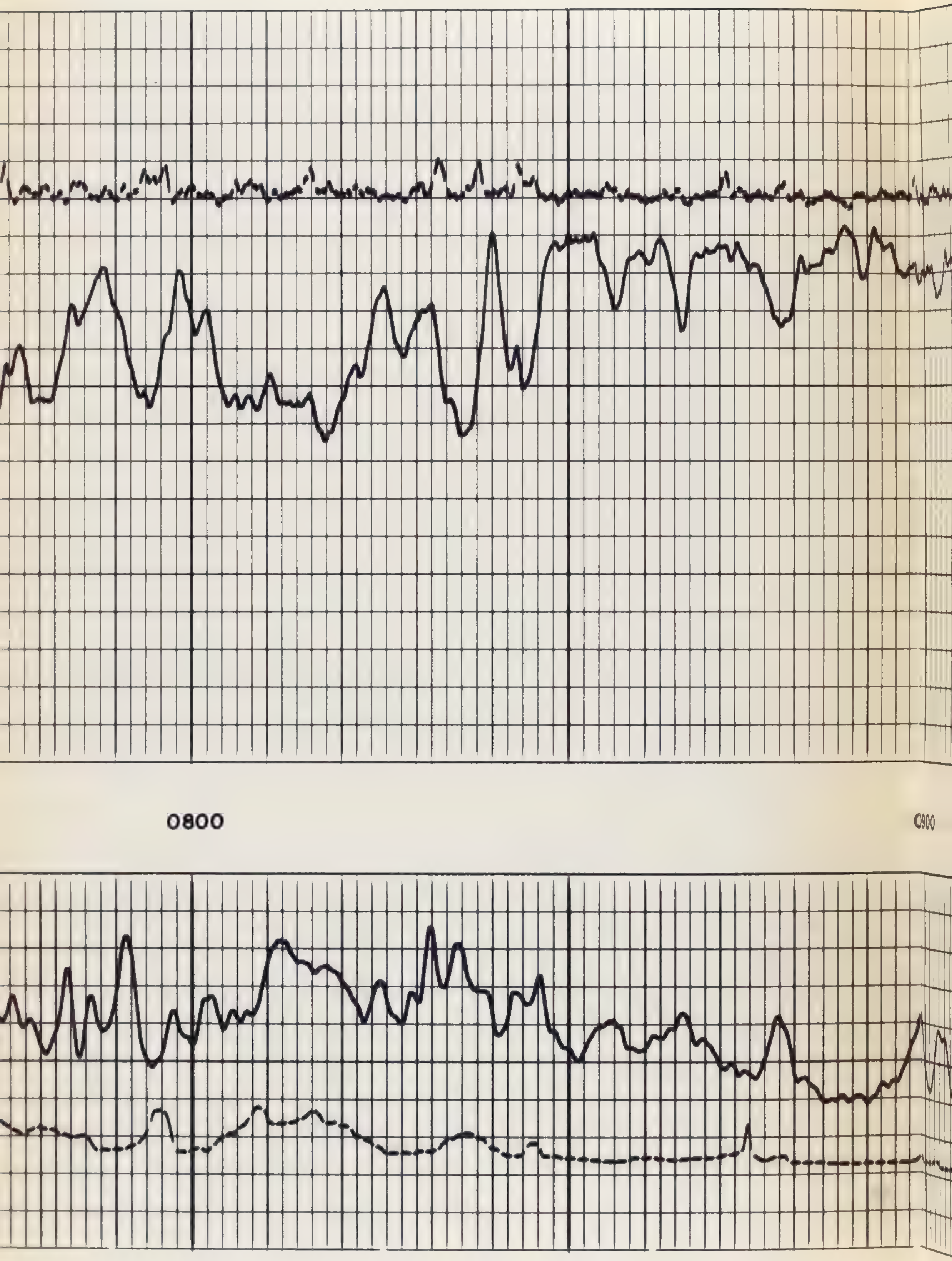
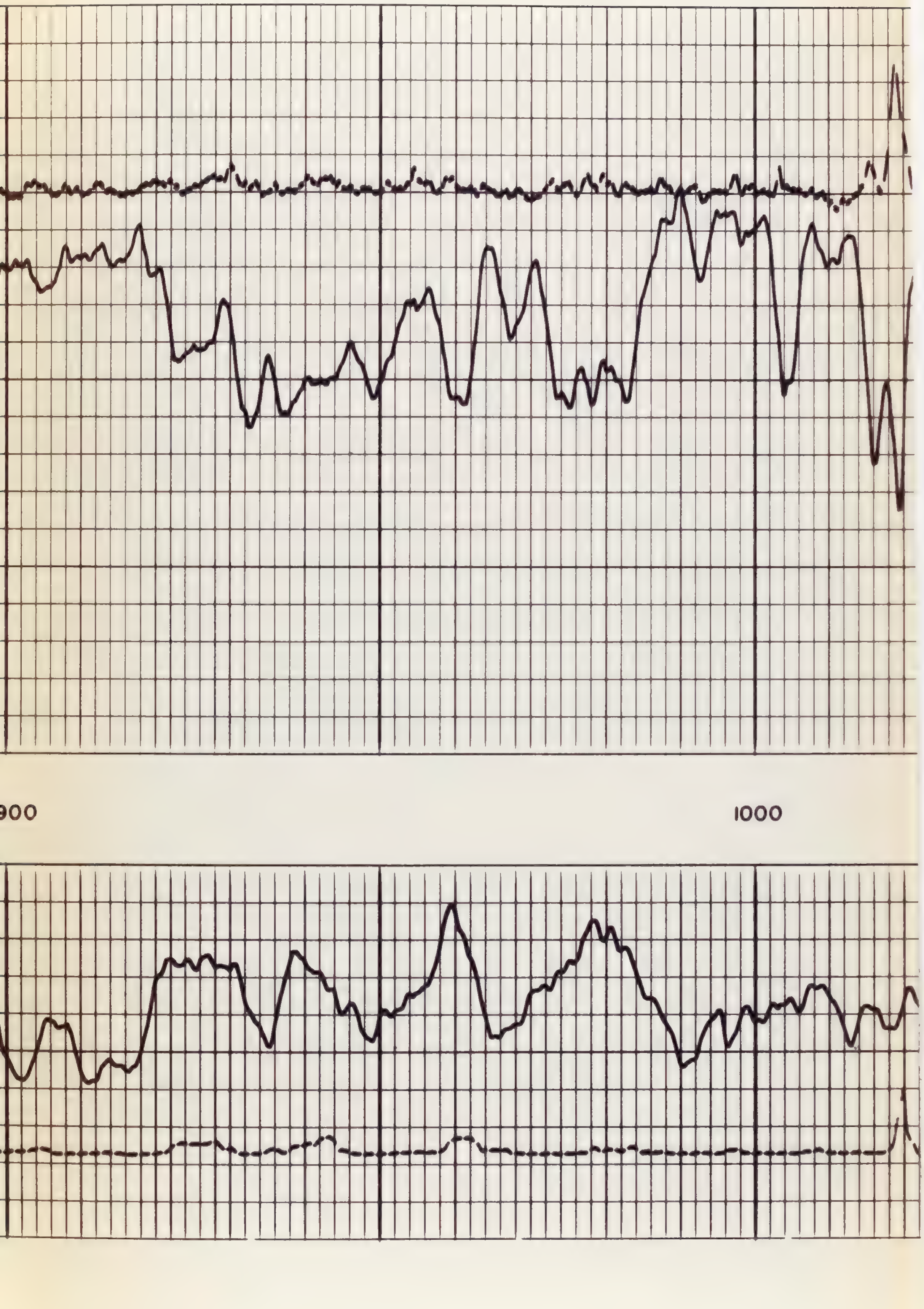
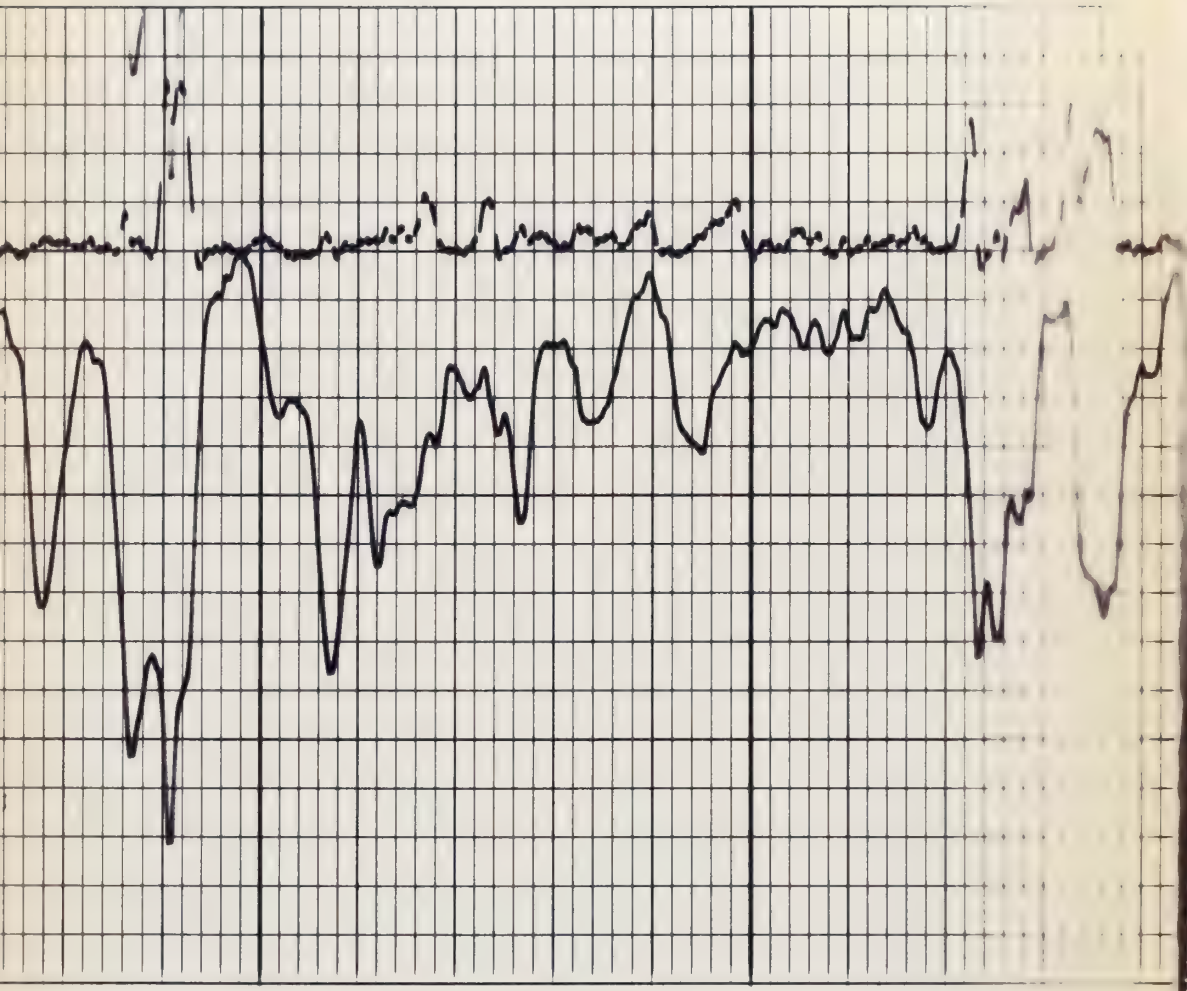

0800
0900


900
1000



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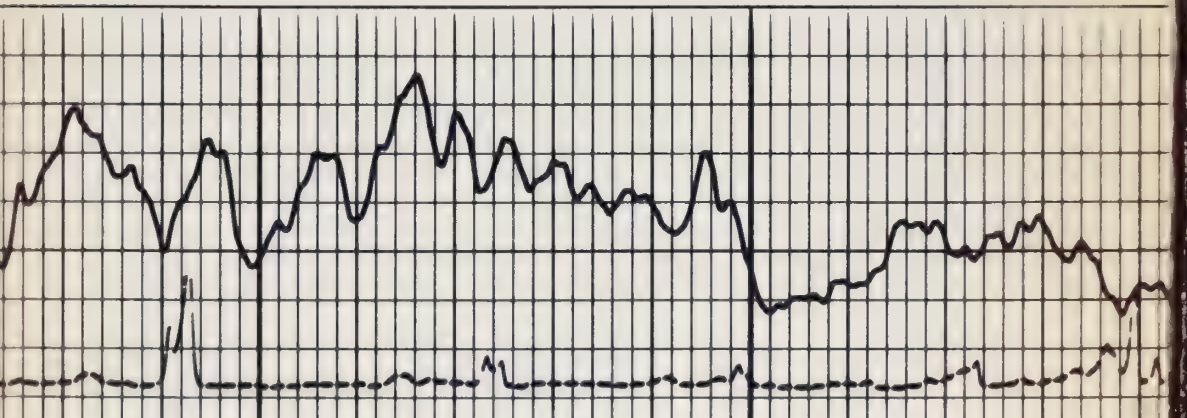

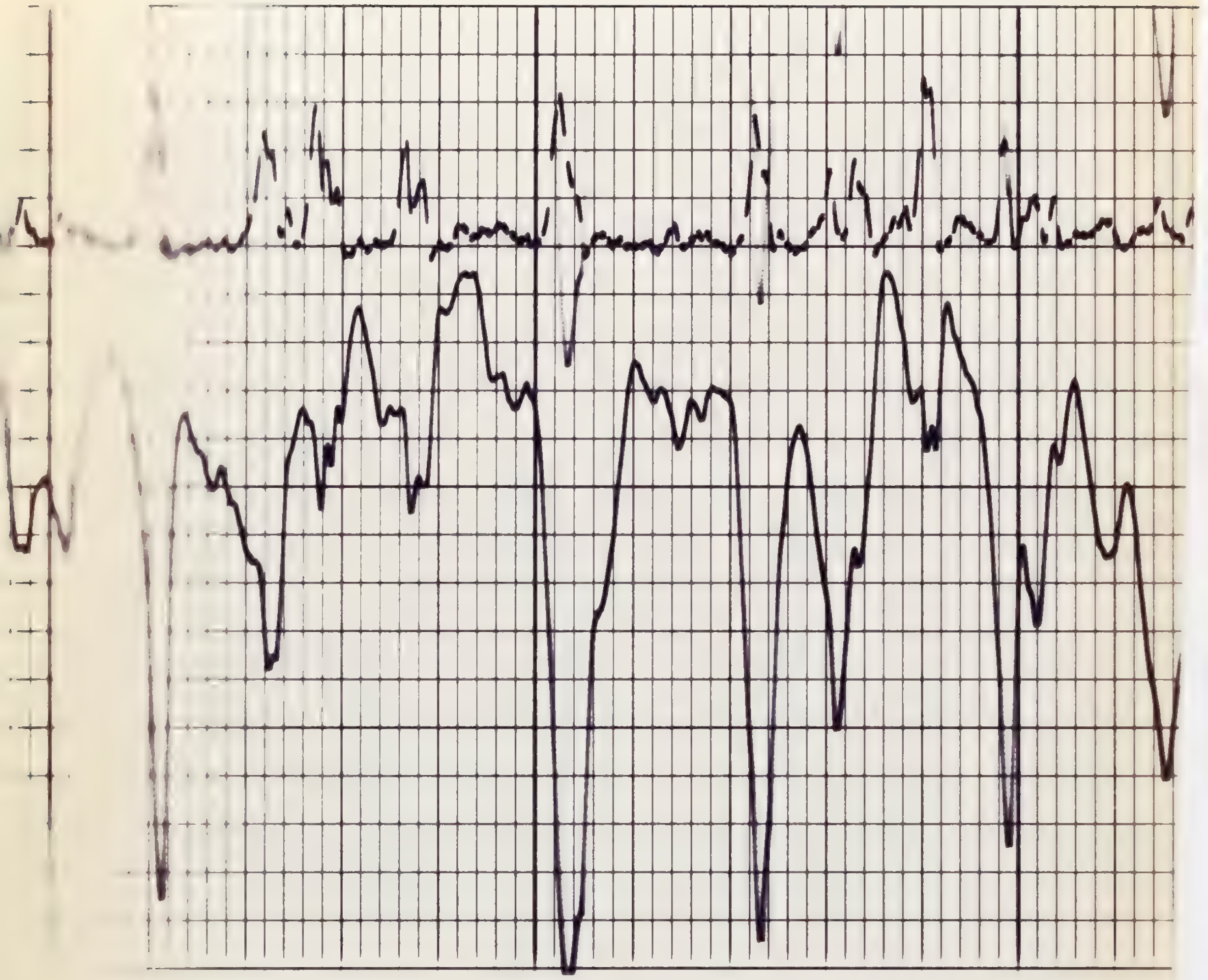

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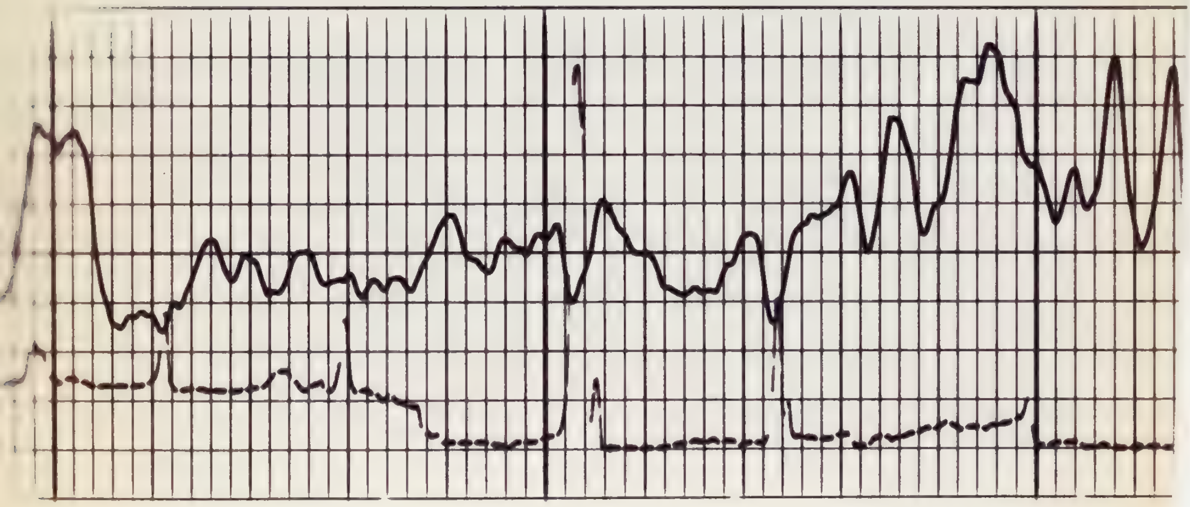

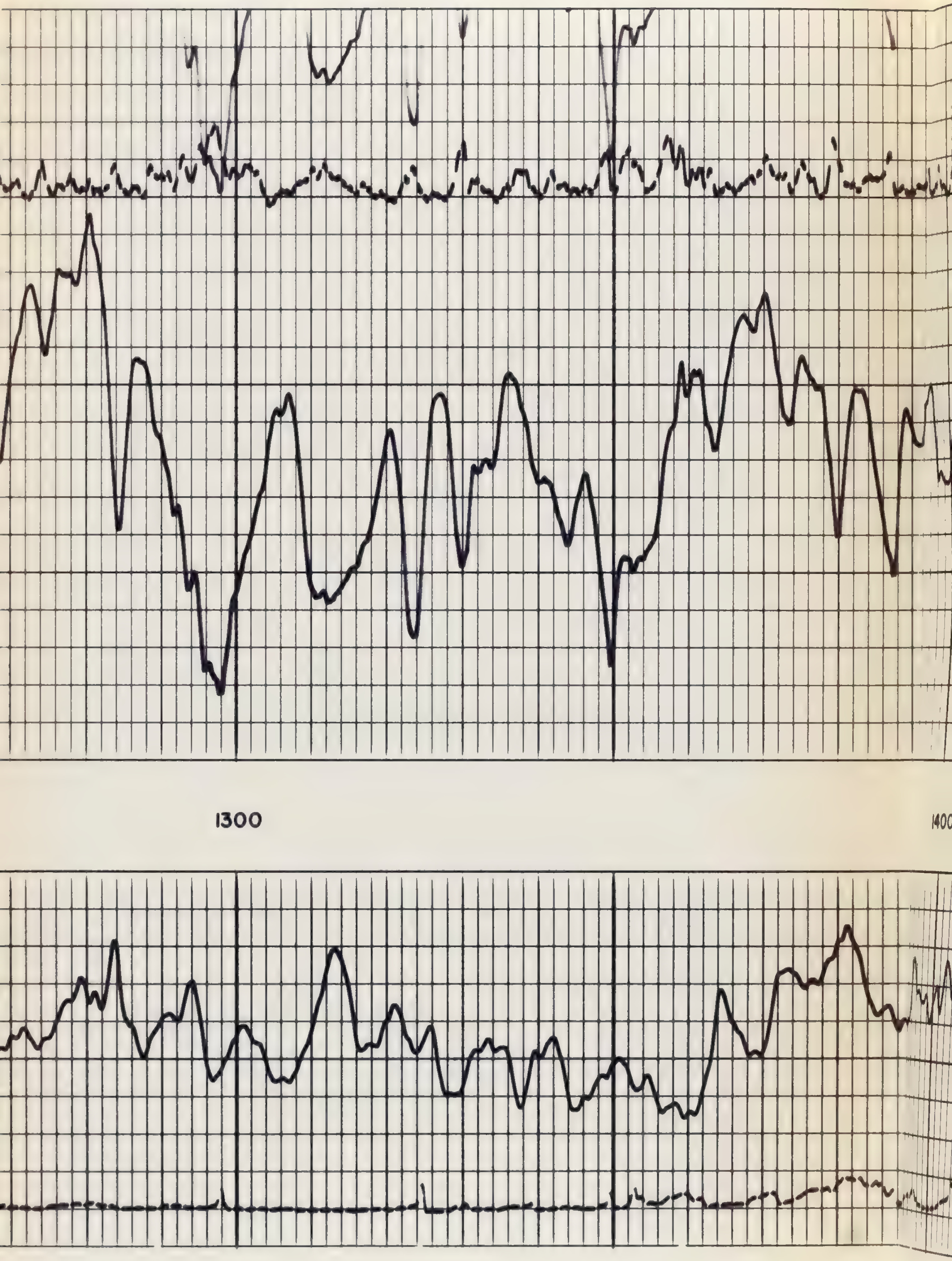
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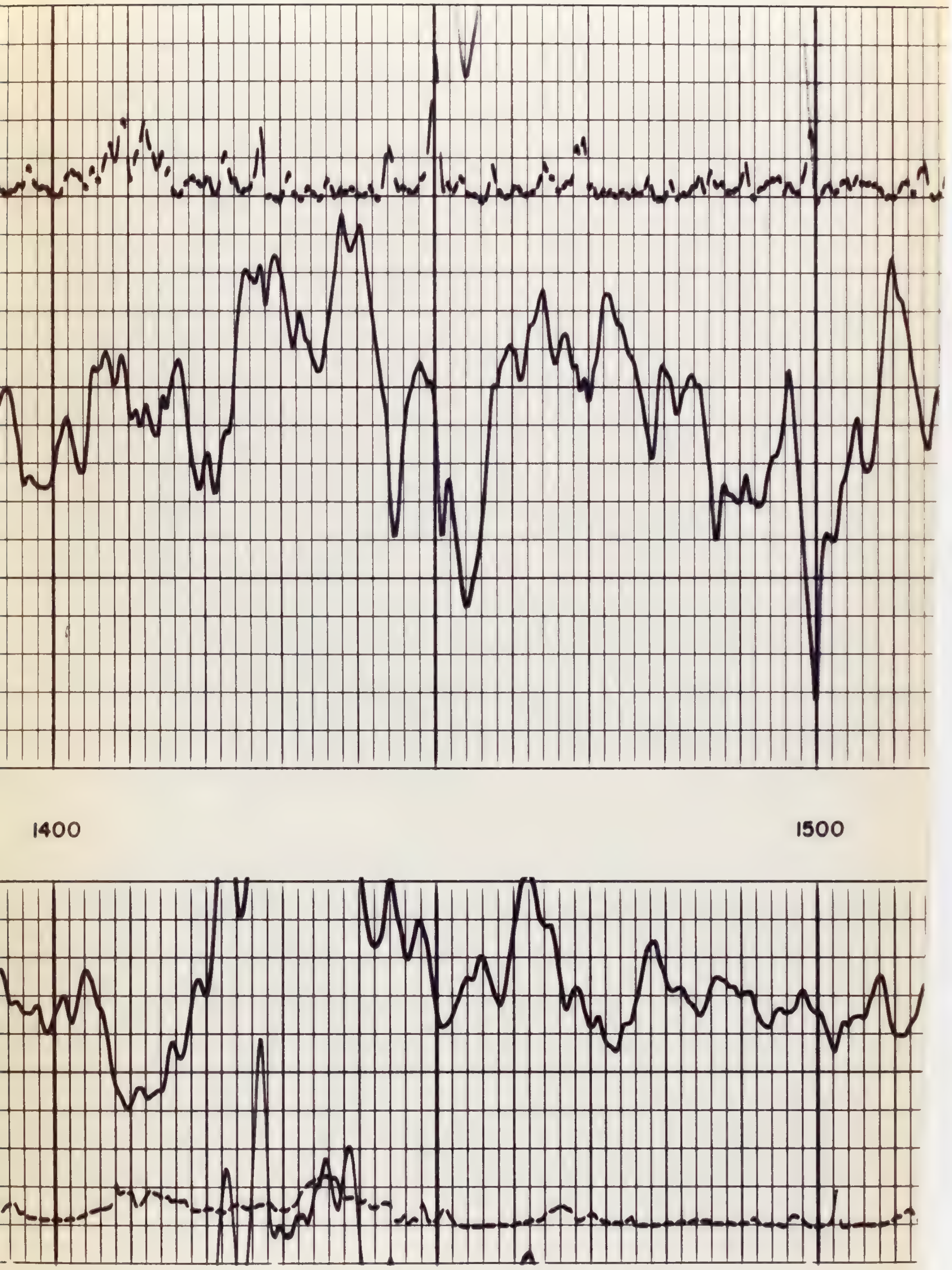
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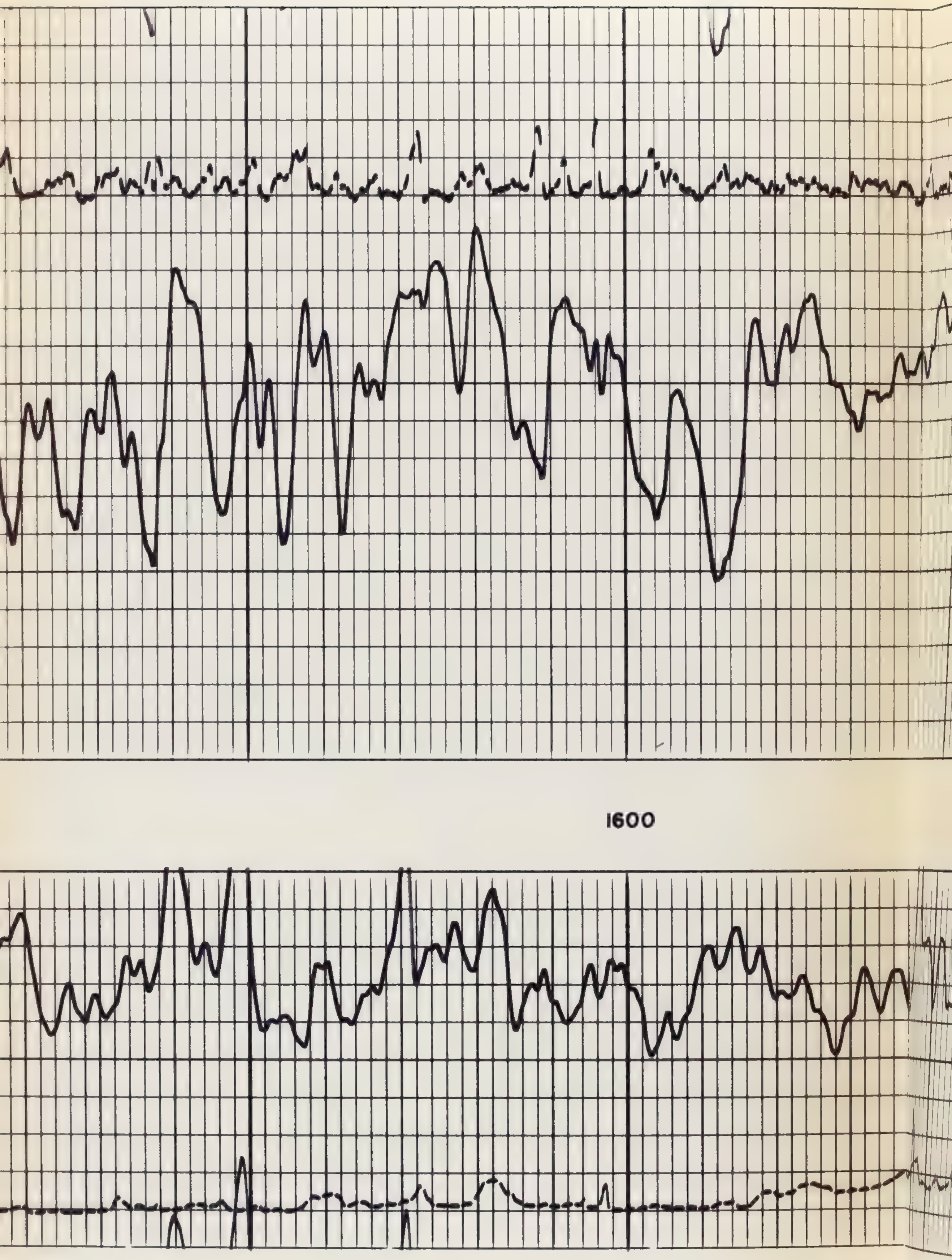
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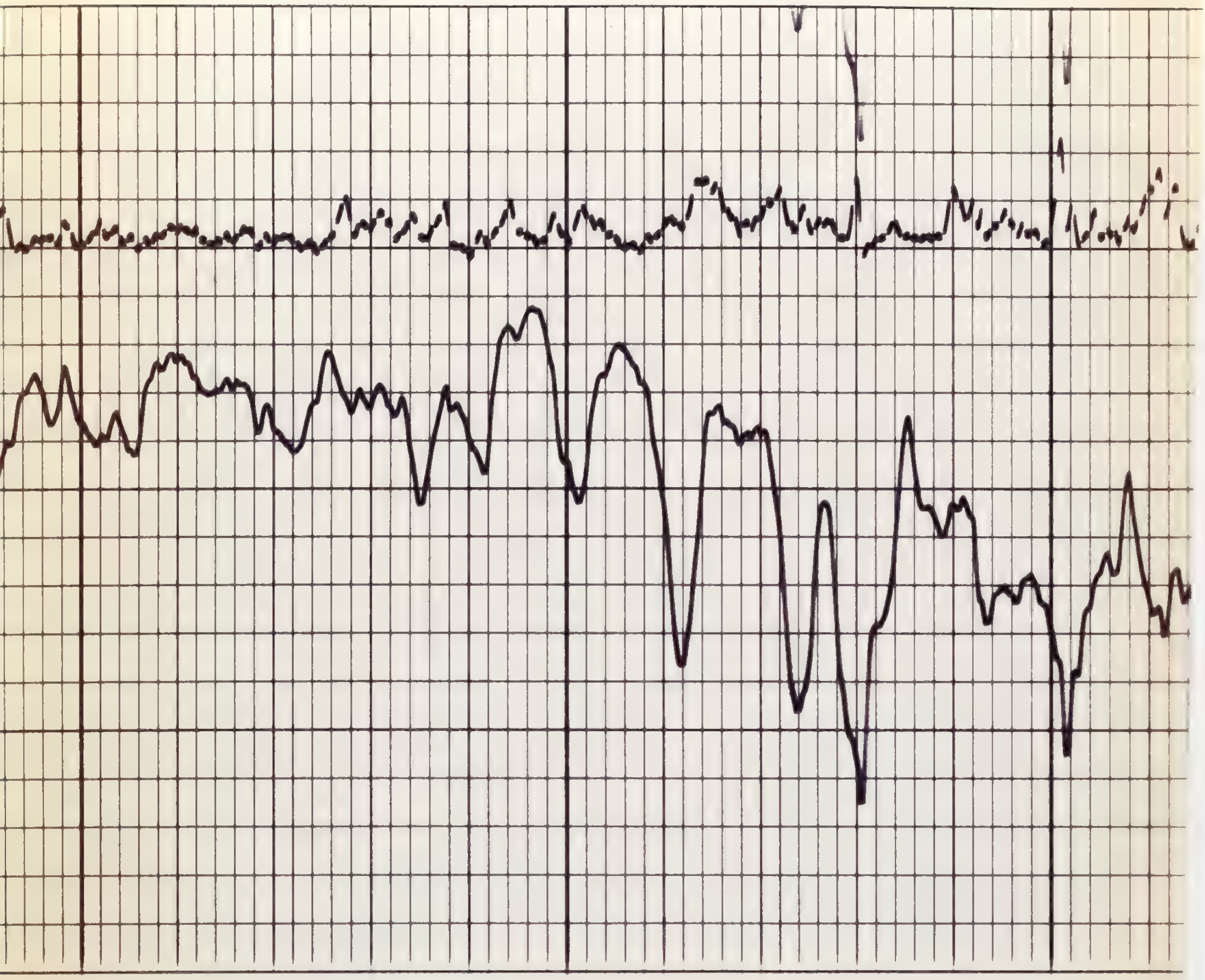

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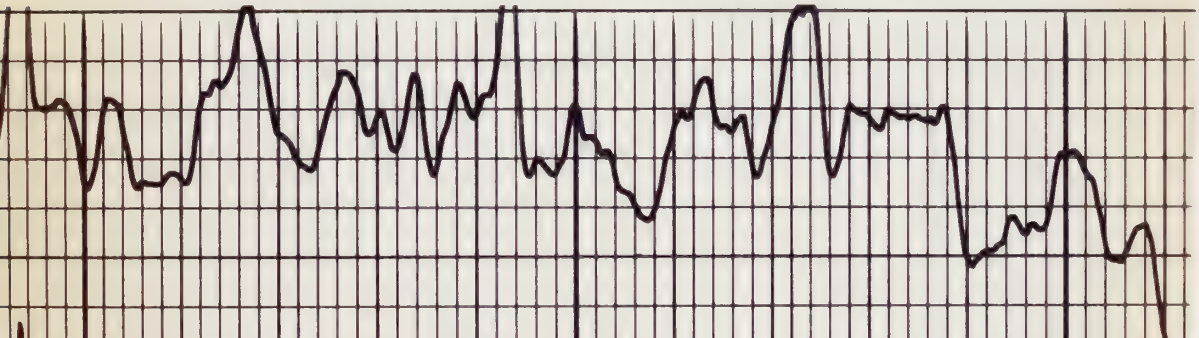

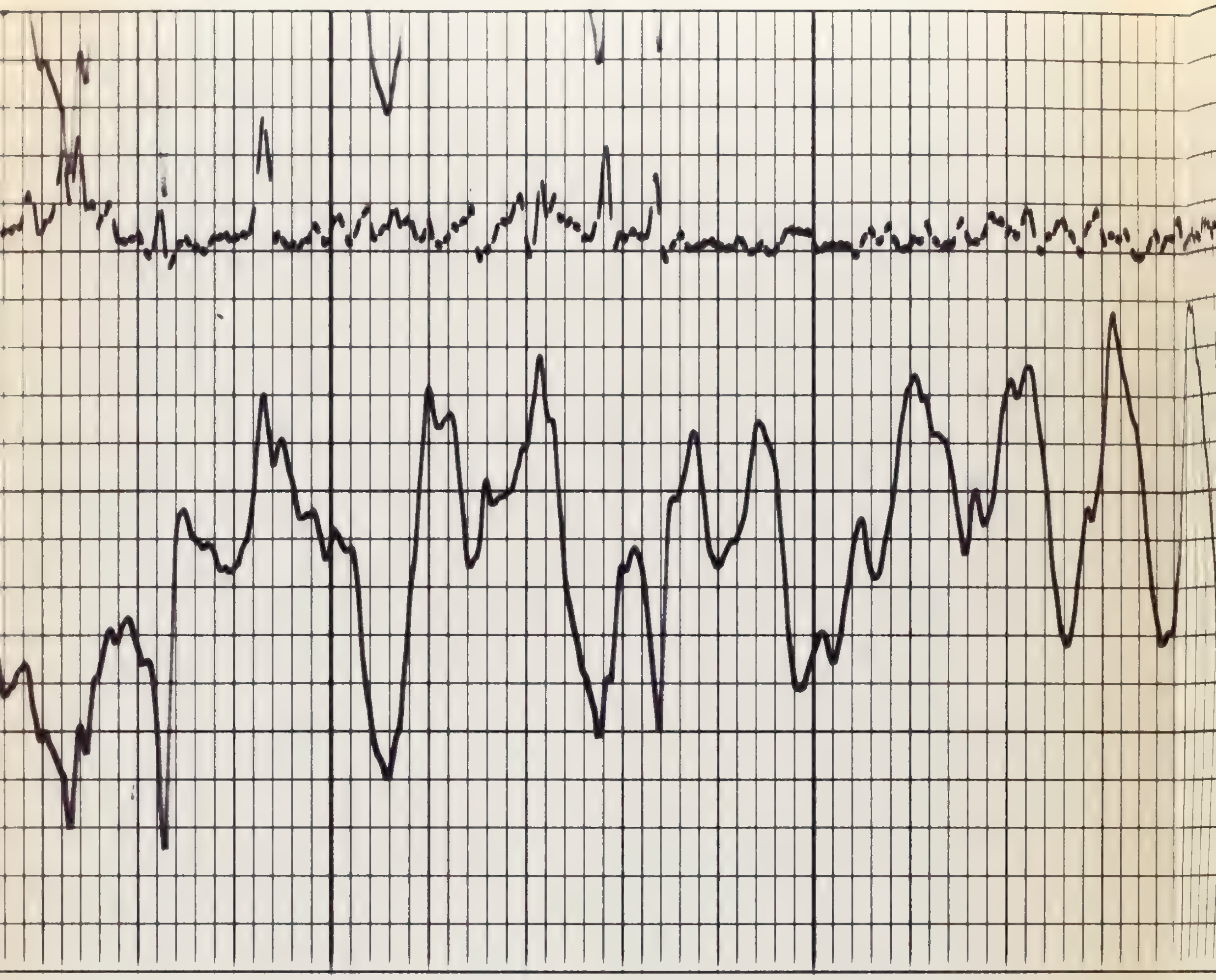

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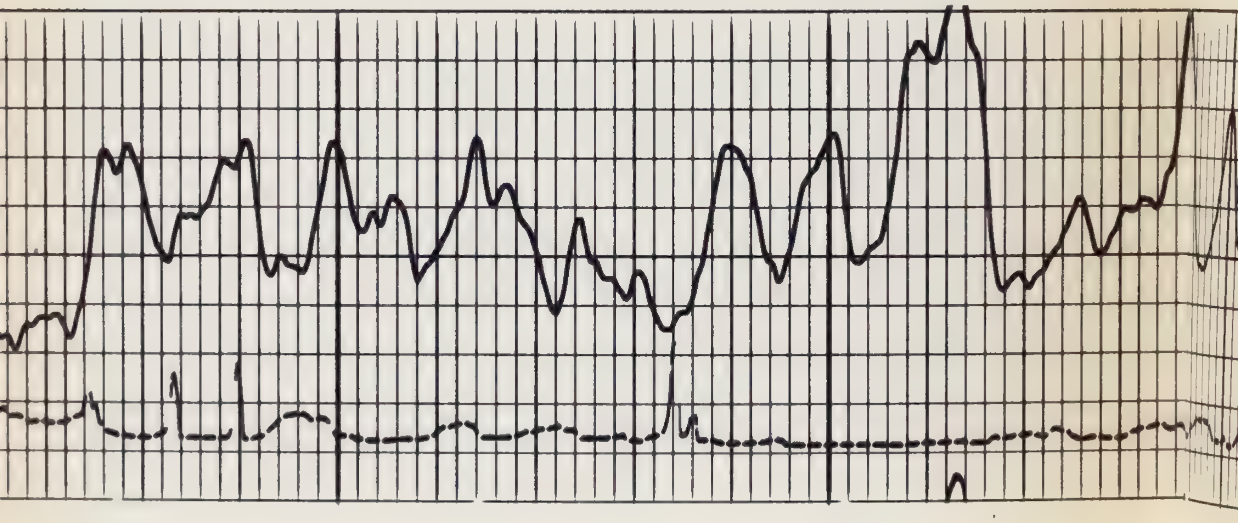

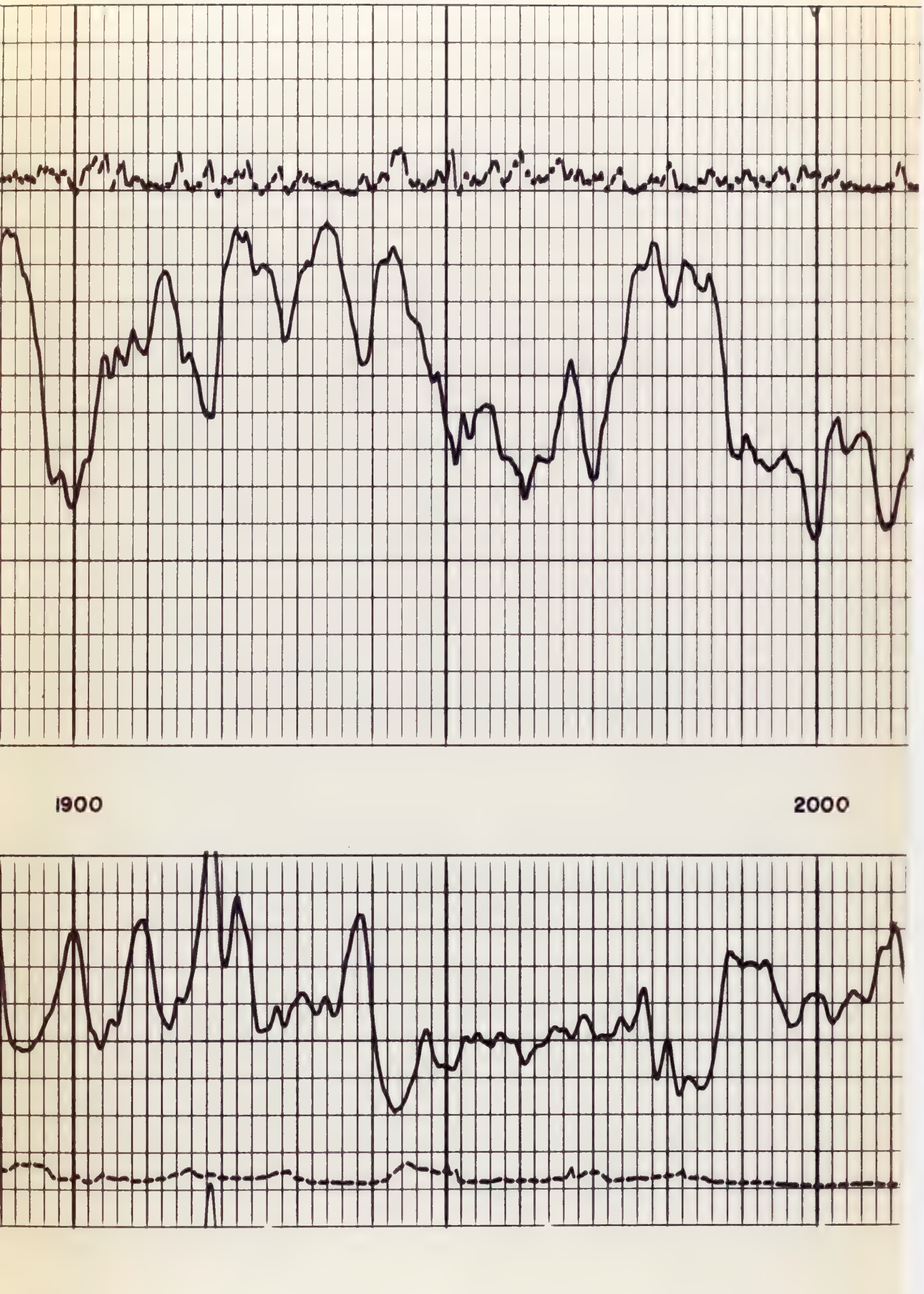

1900
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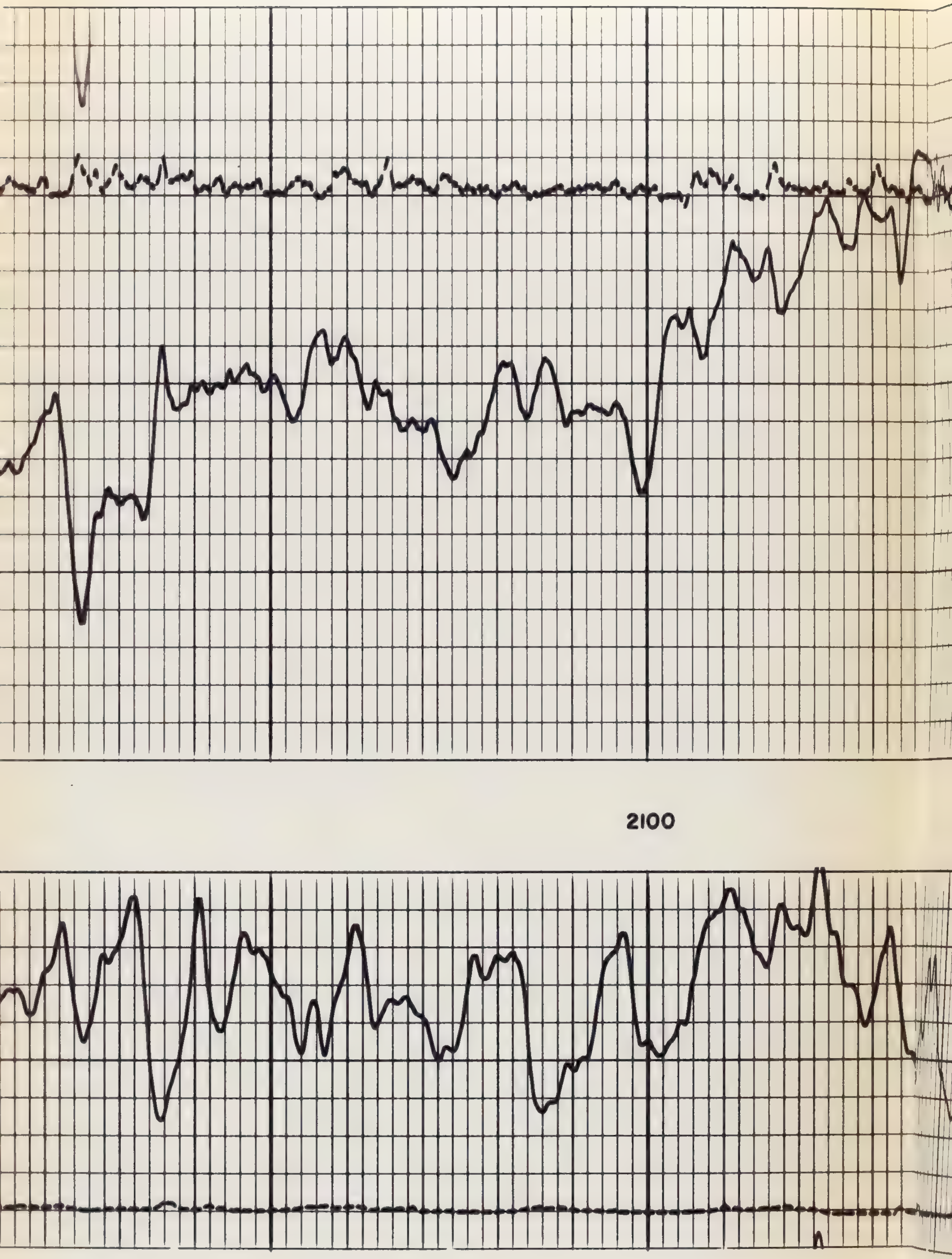
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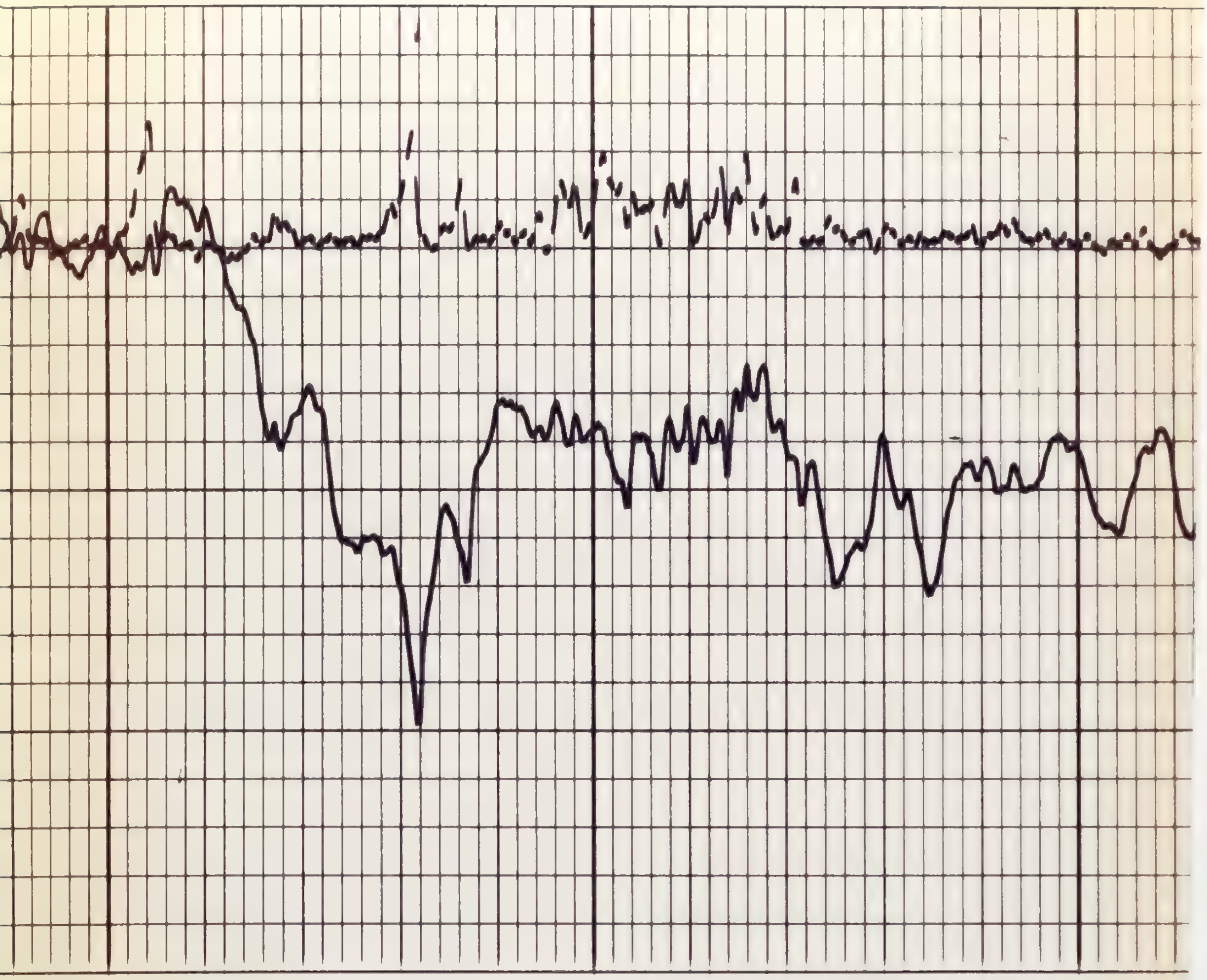
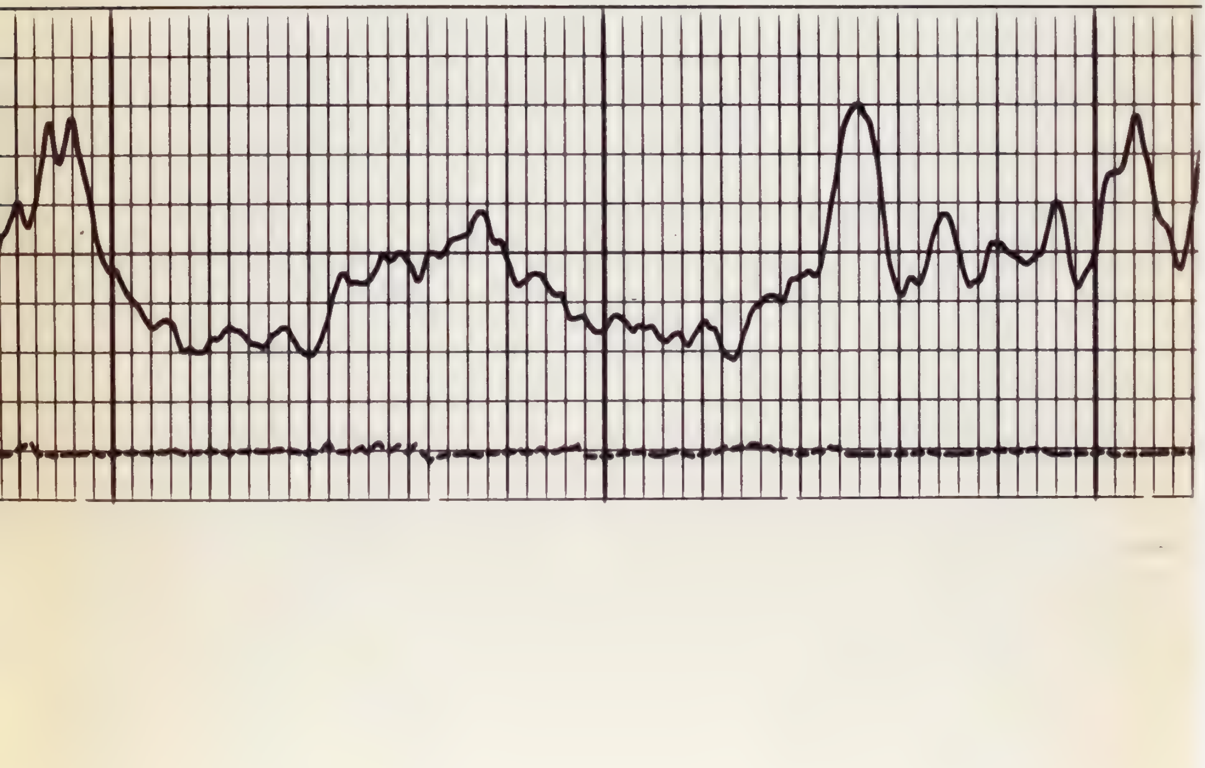
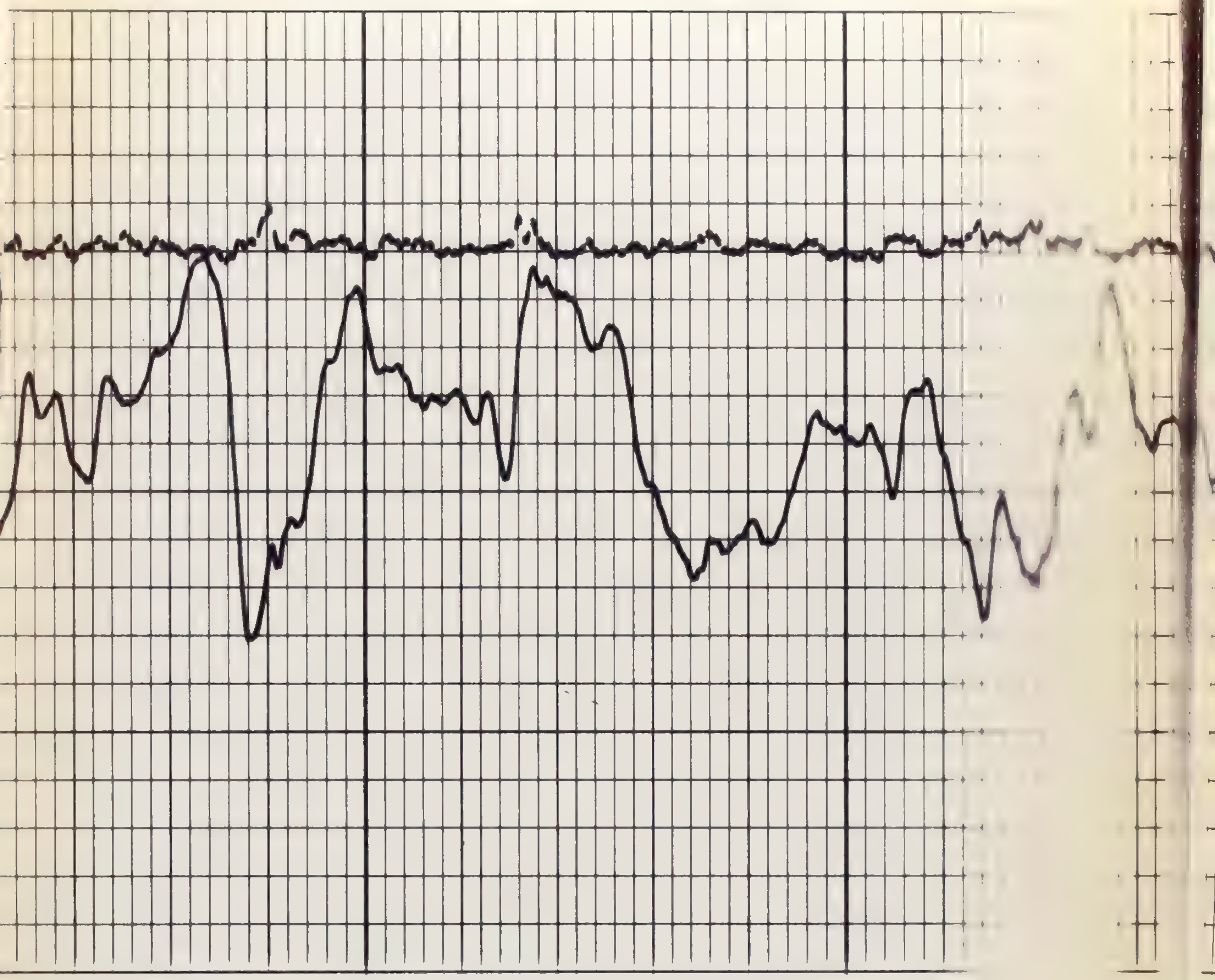
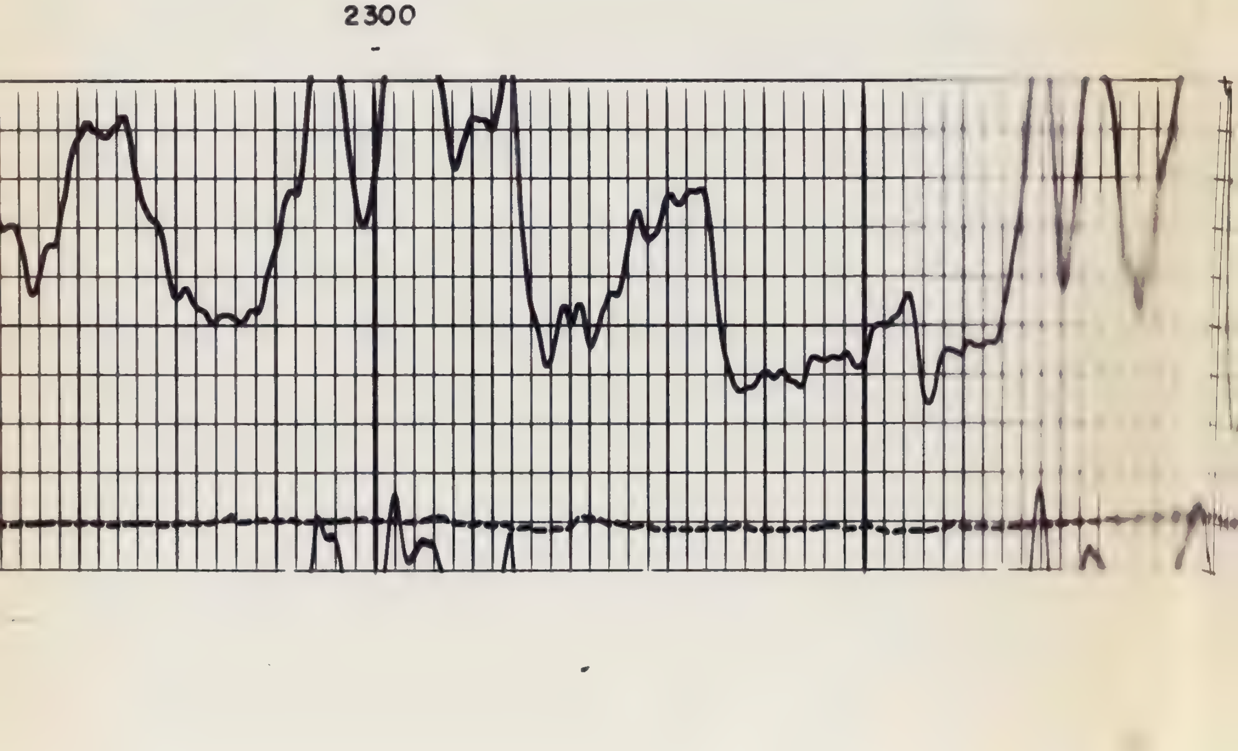


2200



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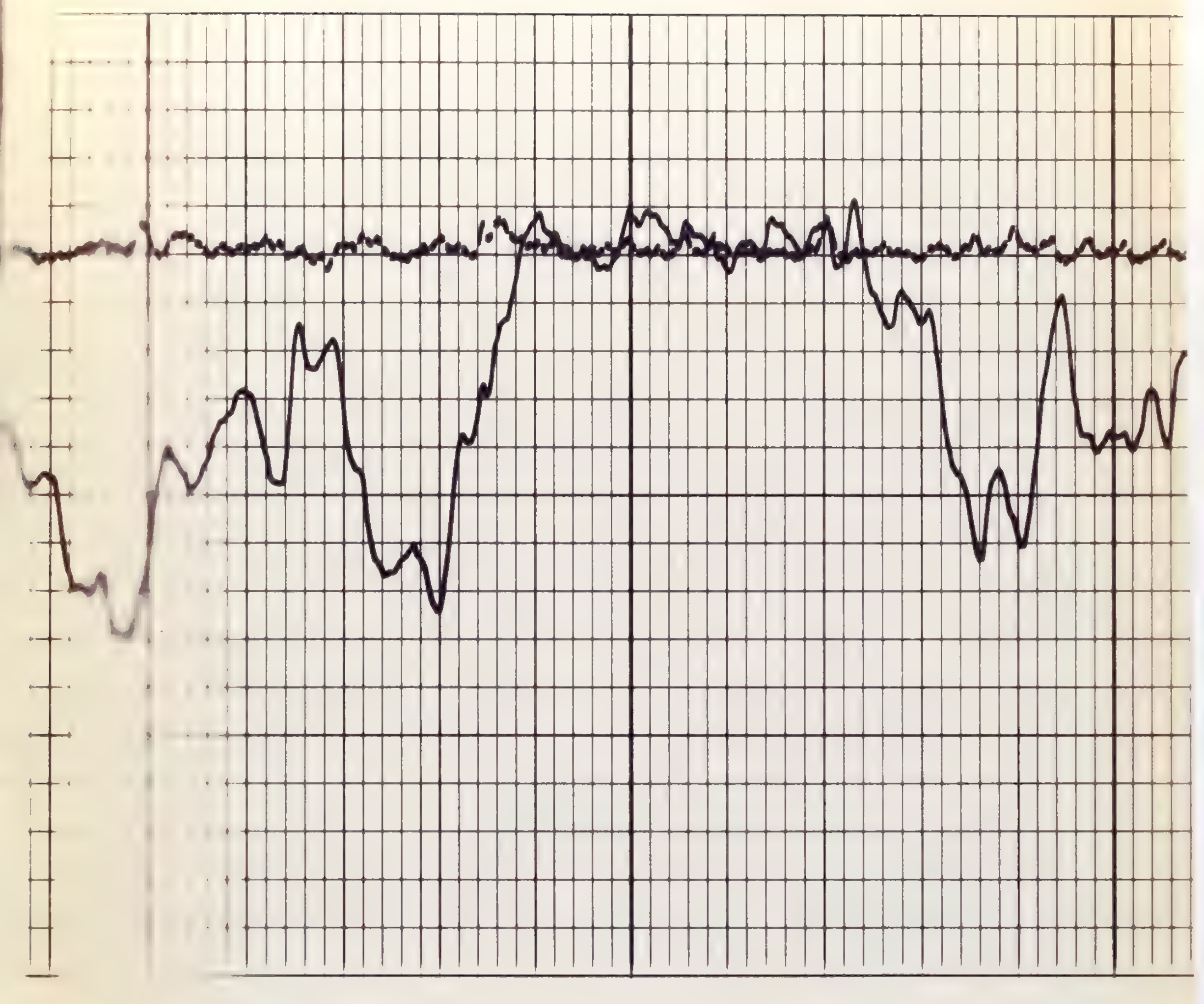
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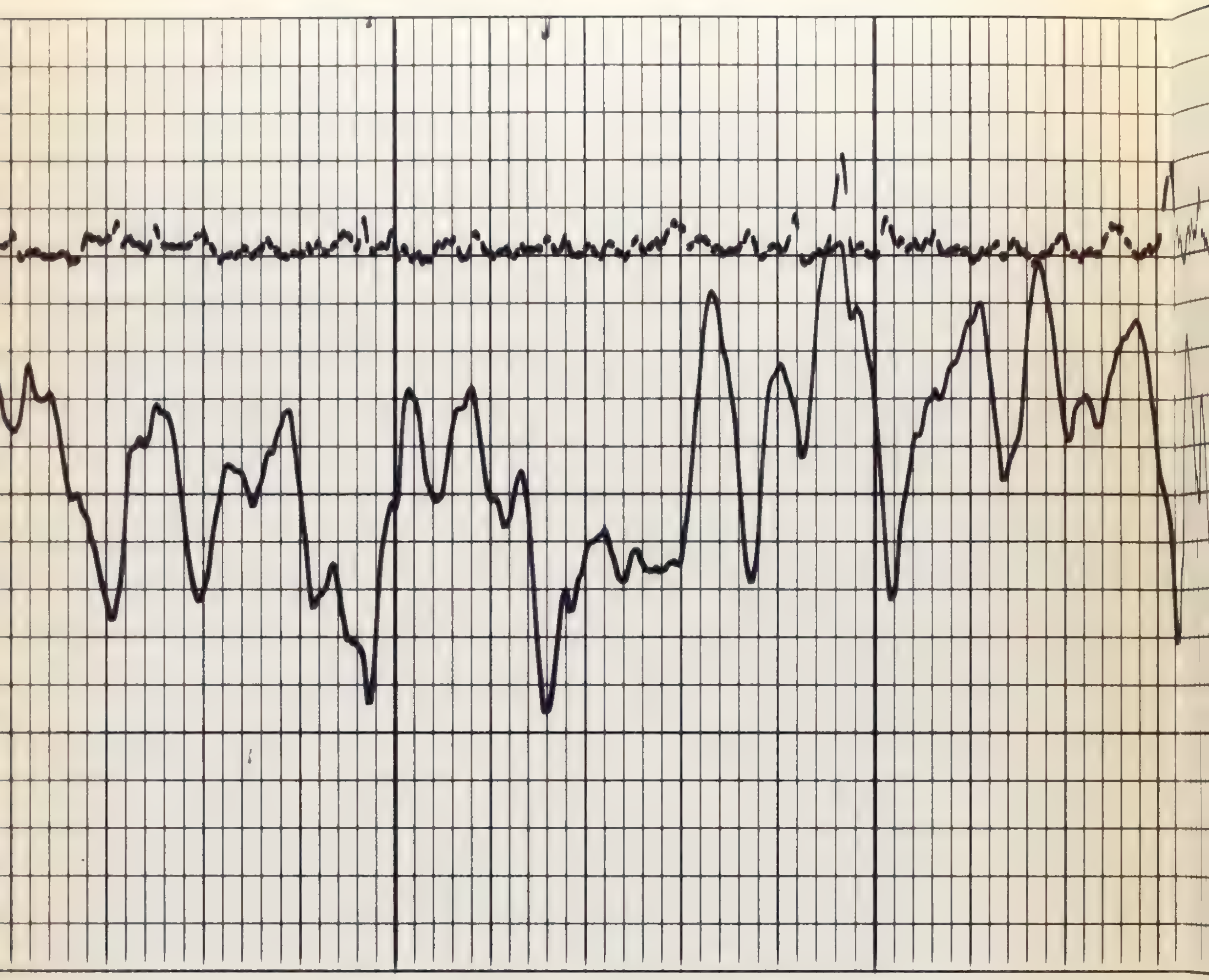
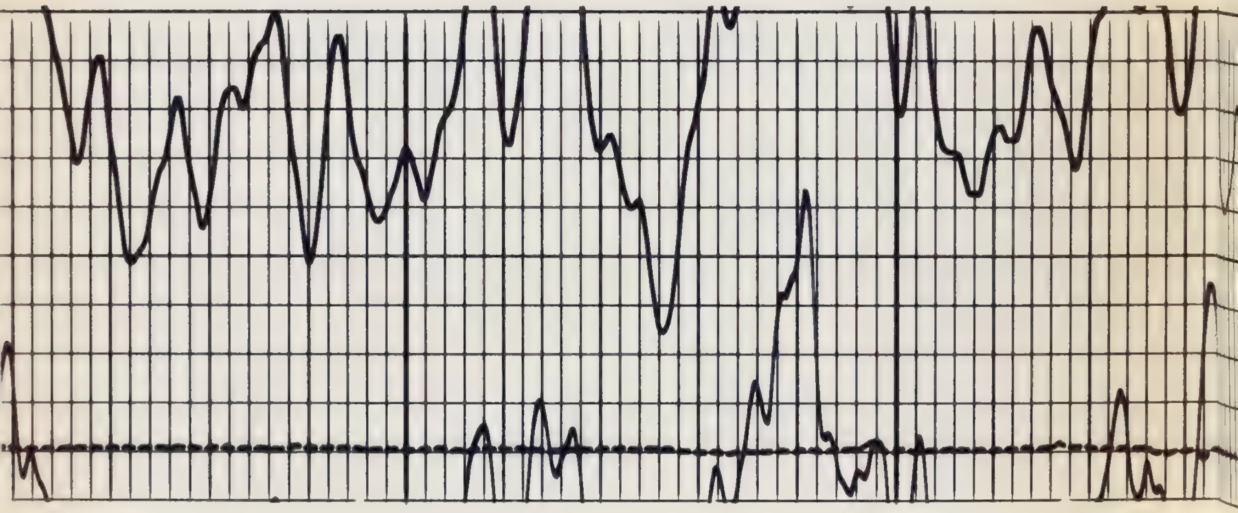
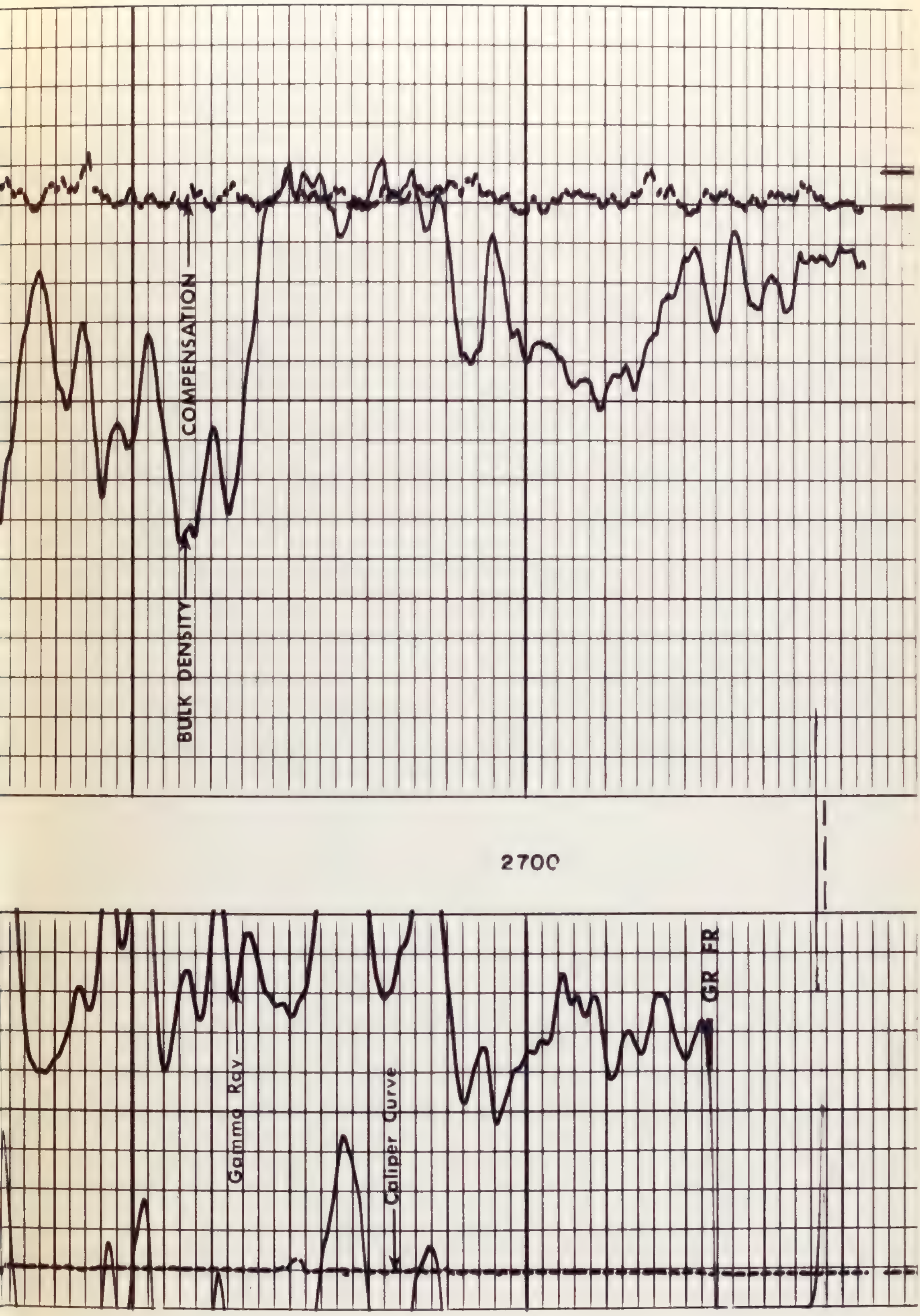
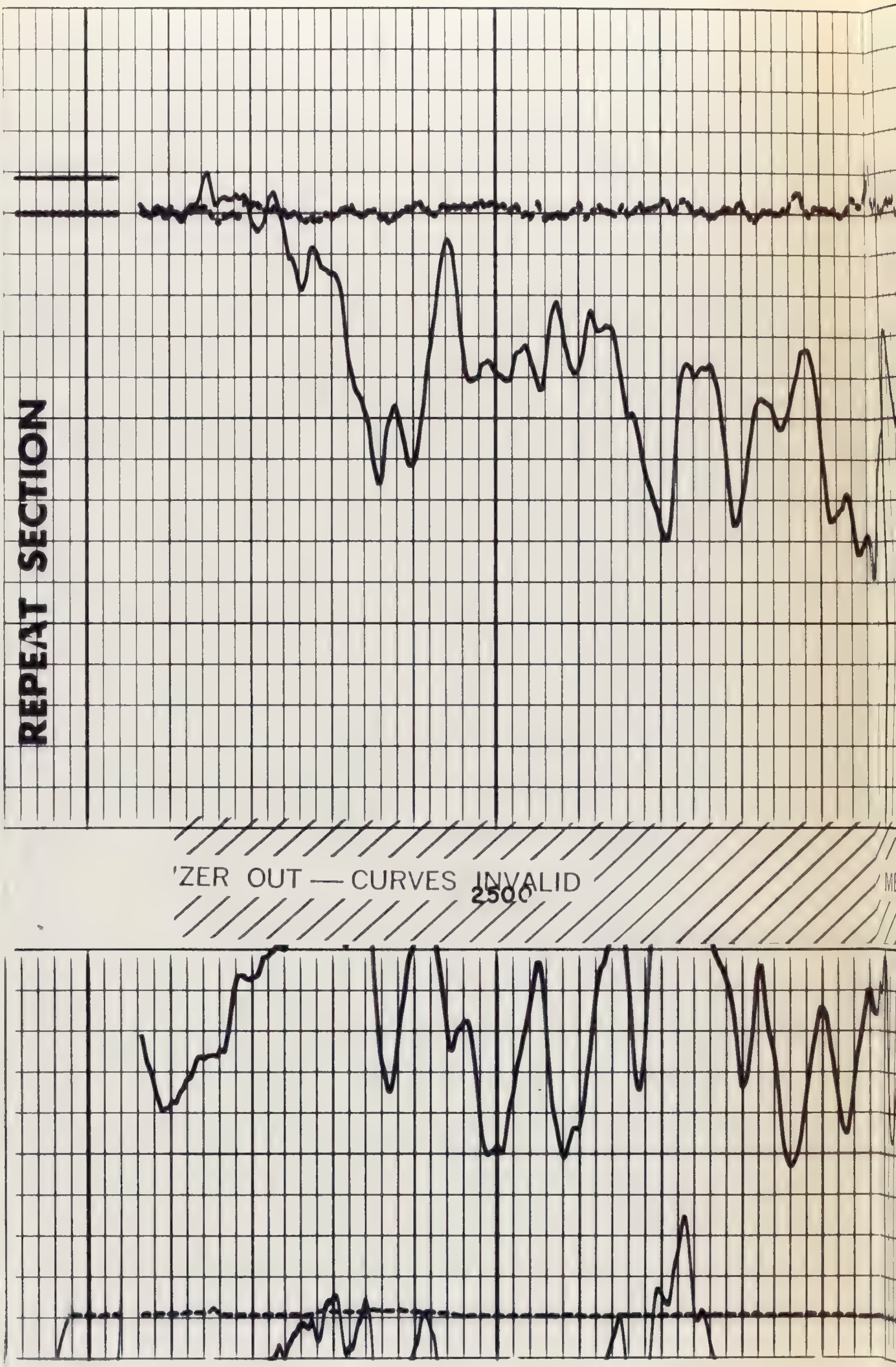
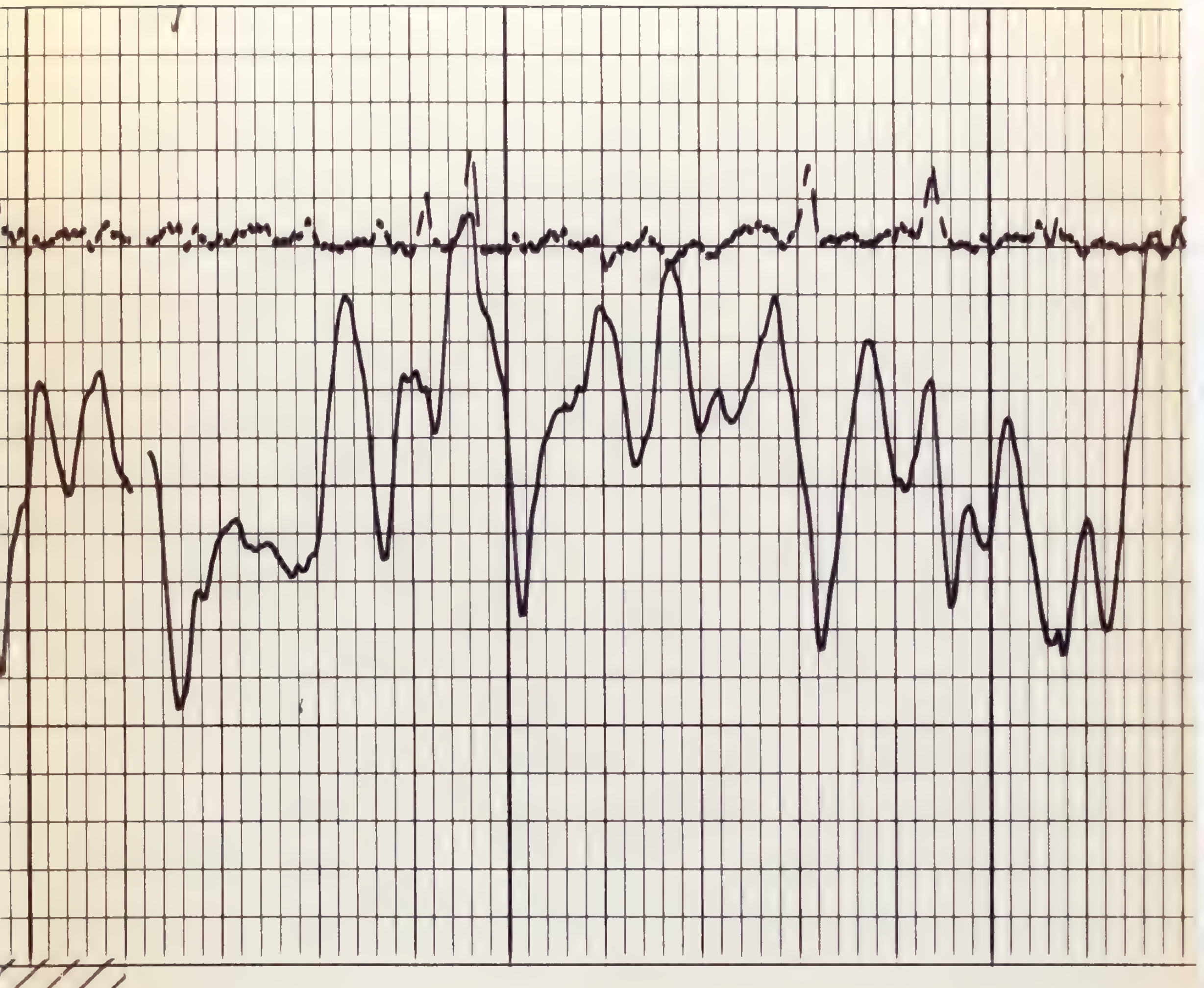
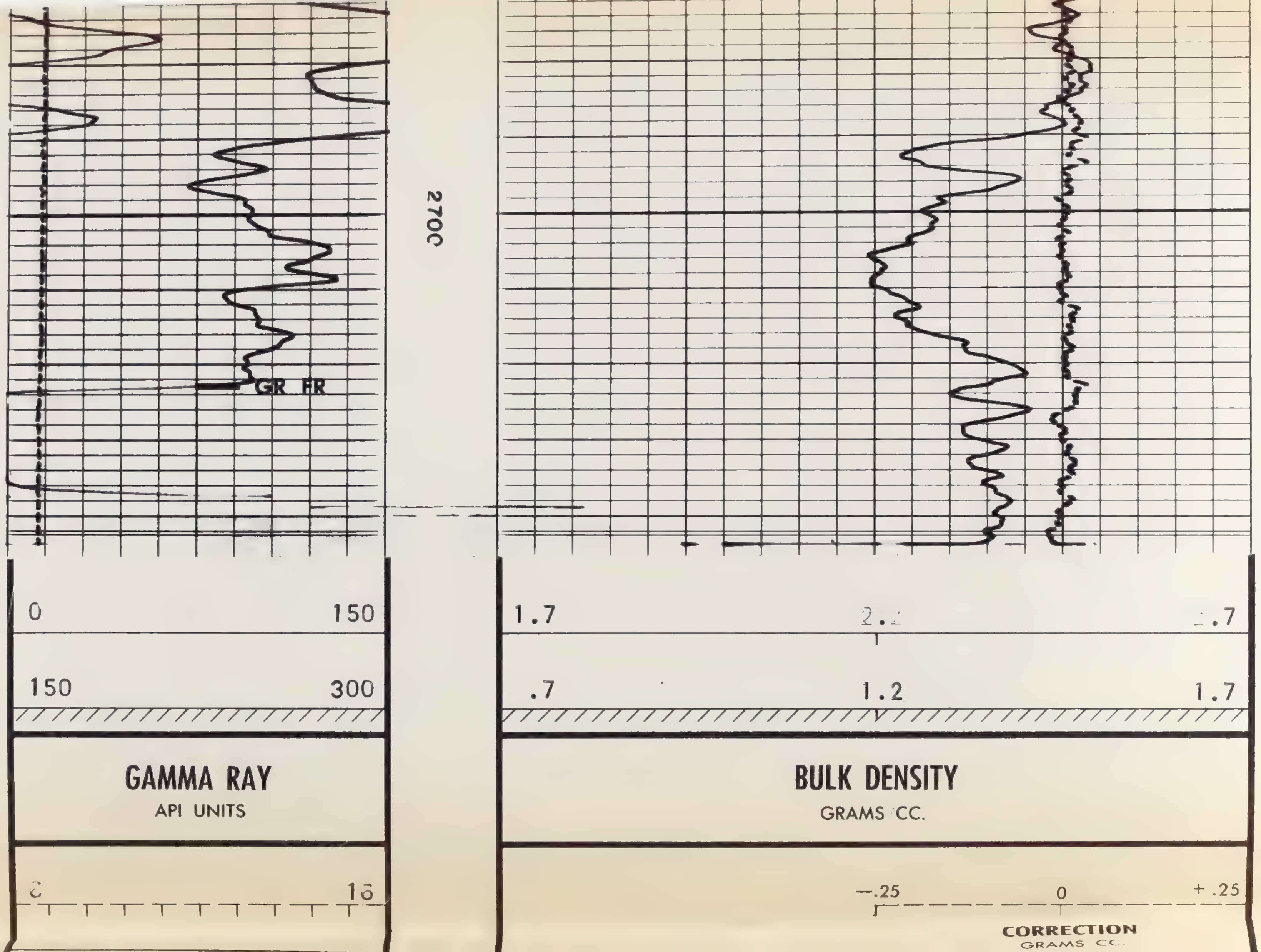



2600


COMPENSATION
BULK DENSITY
2700
Gamma Ray
Caliper Curve
GR FR


REPEAT SECTION
'ZER OUT — CURVES INVALID
2500


MEMO
2600


2700
GR FR
0
150
150
300
GAMMA RAY
API UNITS
0
16
1.7
2.2
2.7
.7
1.2
1.7
BULK DENSITY
GRAMS/CC.
−.25
0
+.25
CORRECTION
GRAMS CC.

CORRECTION
GRAMS CC.

CALIPER
HOLE DIAM. IN INCHES

DEPTHS

COMPANY ATLANTIC RICHFIELD COMPANY

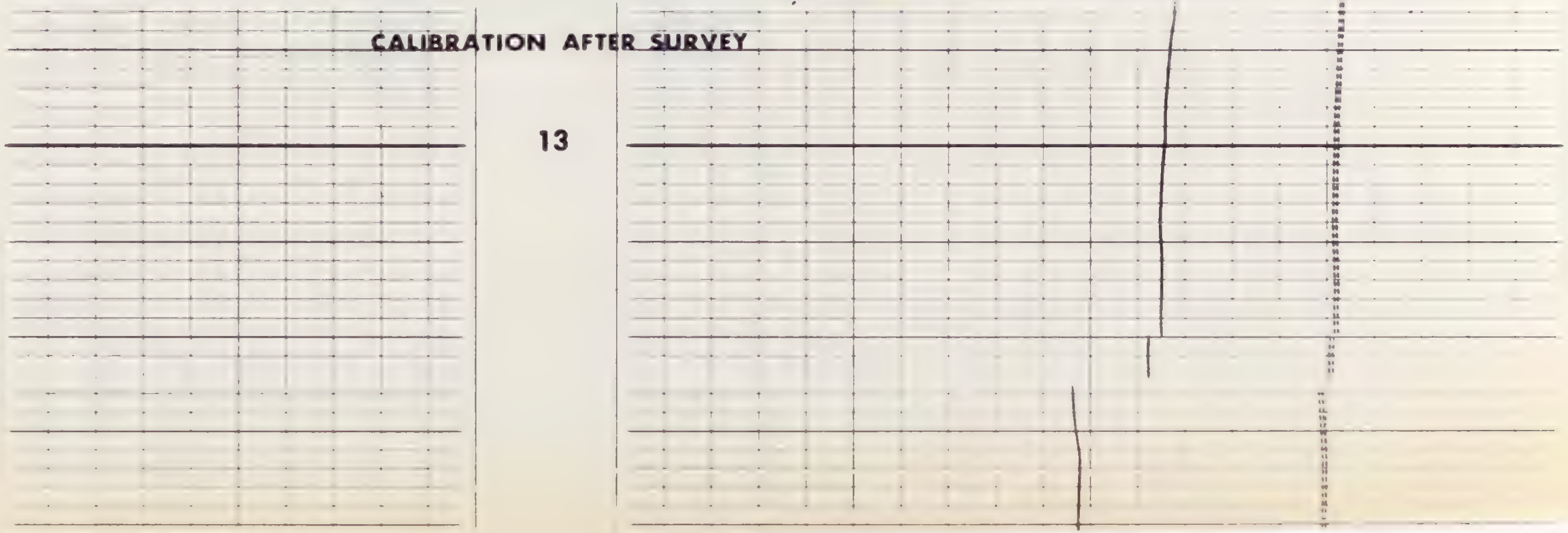
WELL S. G. NO. 9

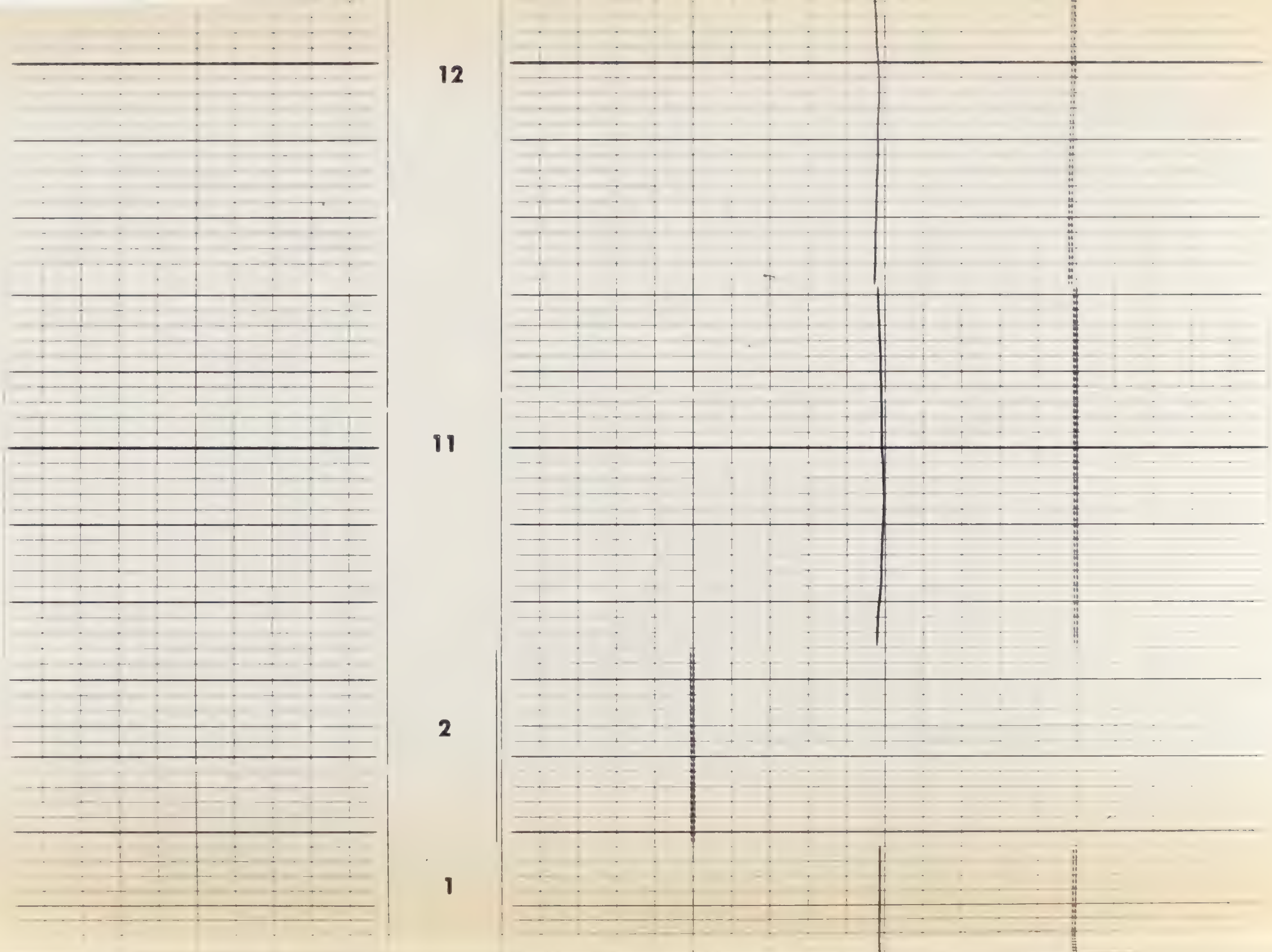
FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

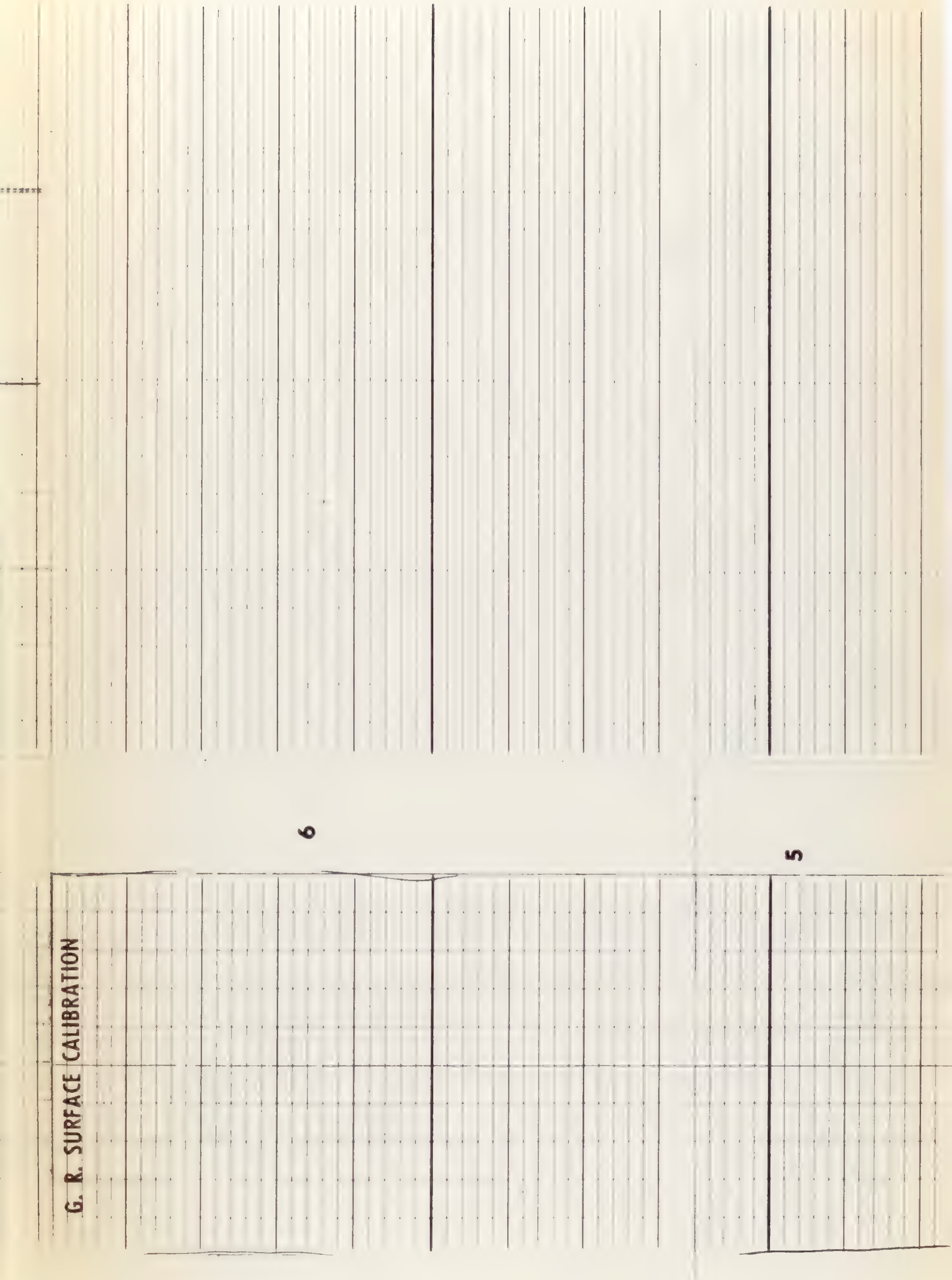
SCHL. FR 2739
SCHL. TD 2740
DRLR TD 2750
Elev:
KB 6878
DF
GL 6870

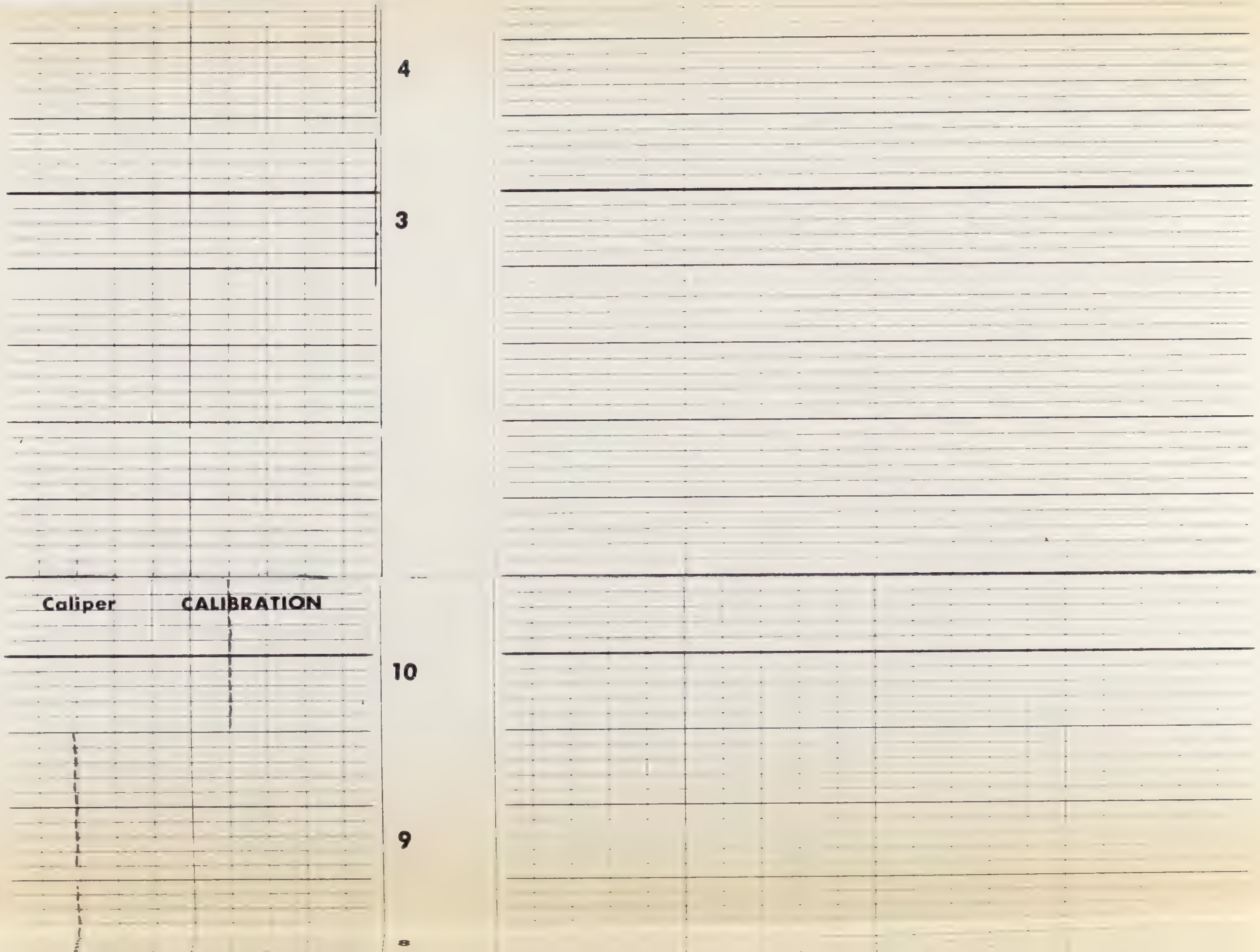
CALIBRATION RECORD

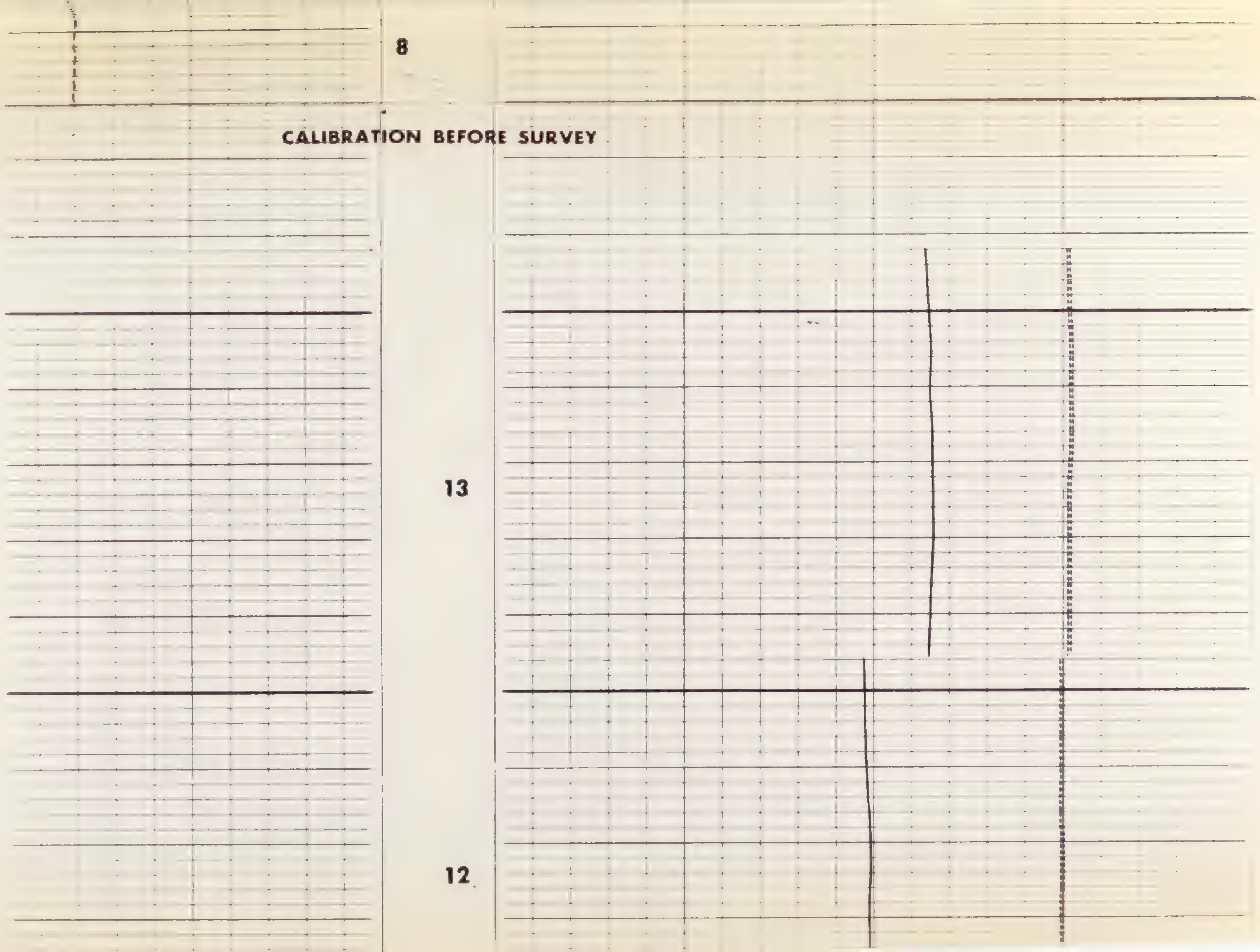


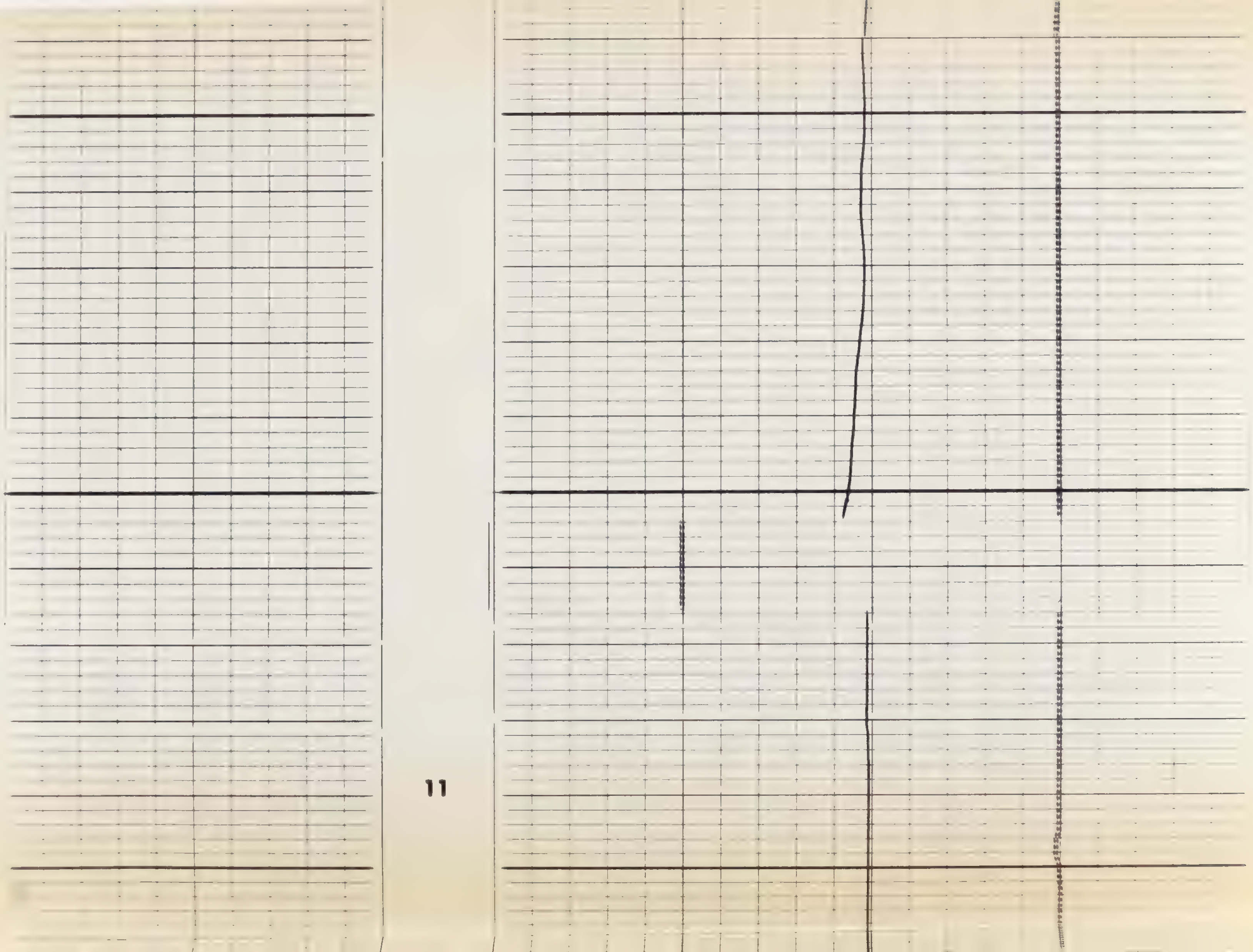


G. R. SURFACE CALIBRATION


G. R. SURFACE CALIBRATION
6
5


4
3
Caliper
CALIBRATION
10
9
8


8
CALIBRATION BEFORE SURVEY
13
12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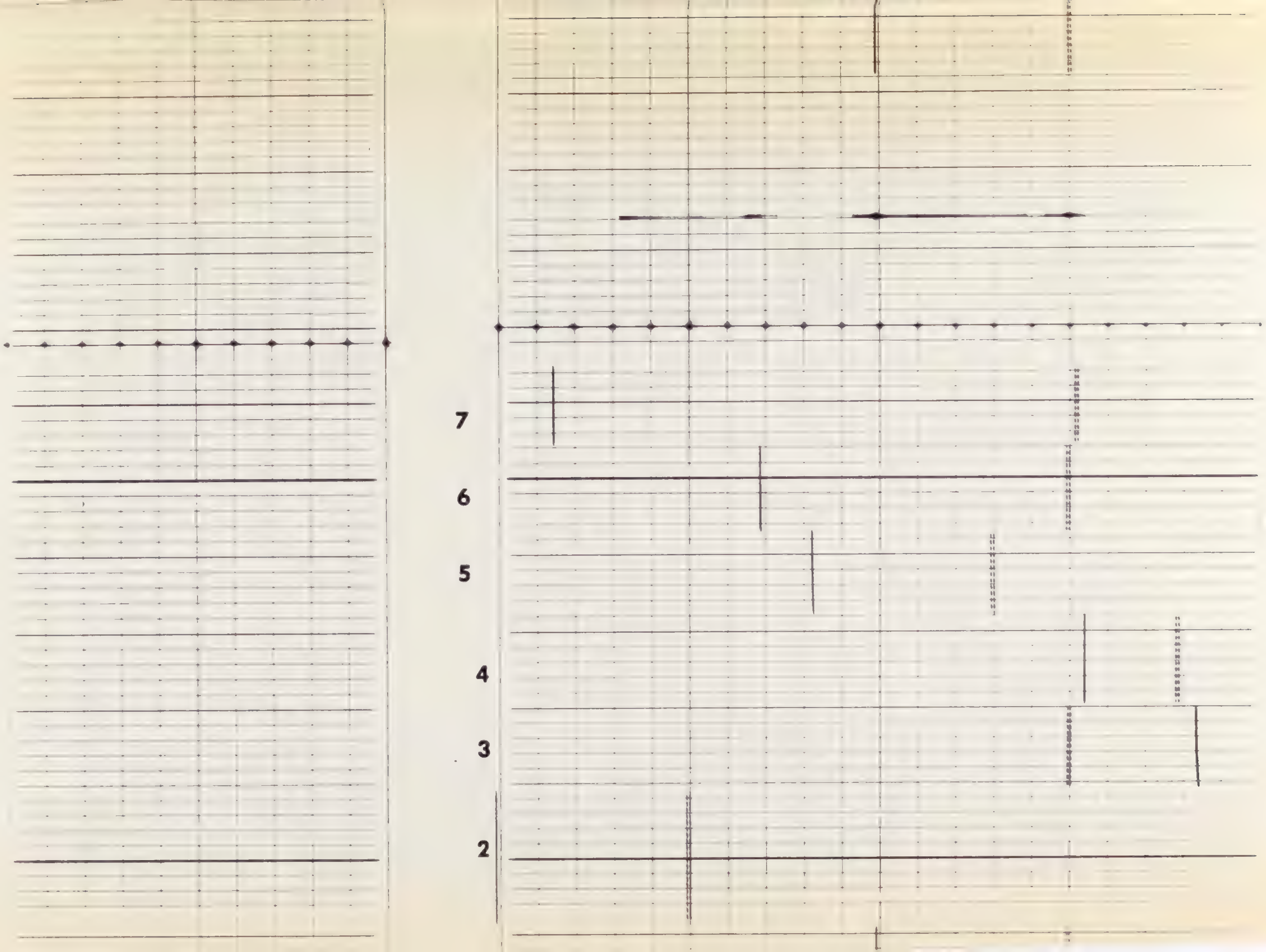

7
6
5
4
3
2

FORMATION DENSITY COMPENSATED CALIBRATION CODING

1. MECHANICAL ZERO
2. RECORDER SENSITIVITY

PANEL TEST

FDC LIQUID

	POS	ρ	$\Delta\rho$
3.	# 1	2.92	.00
4.	# 2	2.78	+.14
5.	# 3	2.42	−.10
6.	# 4	2.35	.00
7.	# 5	2.08	.01

8. MECHANICAL ZERO CALIPER
9. 8″ RING
10. 12″ RING
11. TOOL CALIBRATE # 1 SET $\rho = 2.50$
12. TOOL CALIBRATE # 2 SET $\Delta\rho = .00$
13. LOG POSITION $\rho = 2.59$, $\Delta\rho = .015$

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY
4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATE - SOURCE IN PLACE

CALIBRATION RECORD

ATLANTIC RICHFIELD COMPANY

SCHL. FR 2739

CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

SCHL. FR 2739
SCHL. TD 2740
DRLR TD 2750
Elev:
KB 3878
DF
GL 3870

Schlumberger

TEMPERATURE LOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL S. G. NO. 9
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION

Sec. 11 Twp. 3S Rge. 97W

Other Servic
BHC-GR
DIL
FDC-GR

Permanent Datum: GL ; Elev.: 6870
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B.
D.F.
G.L.

Date		10-25-74		
Run No.		ONE		
Depth—Driller		2750		
Depth—Logger		2744		
Btm. Log Interval		2743		
Top Log Interval		55		
Casing—Driller		7 @ 64	@	@
Casing—Logger				
Casing Size	1	To	To	To
	2	To	To	To
Casing Weight	1			
	2			
Casing Thickness	1			
	2			
Bit Size	1	6-3/4 To TD	To	To
	2	To	To	To
Type Fluid in Hole		WATER & SOAP		
Dens.	Visc.			
Time Since Circ.		40 HOURS		
BHT		132		
Equip.	Location	5602 GJ		
Recorded By		BARGHOUTI		
Witnessed By		BURNS		

SWS-368-C

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

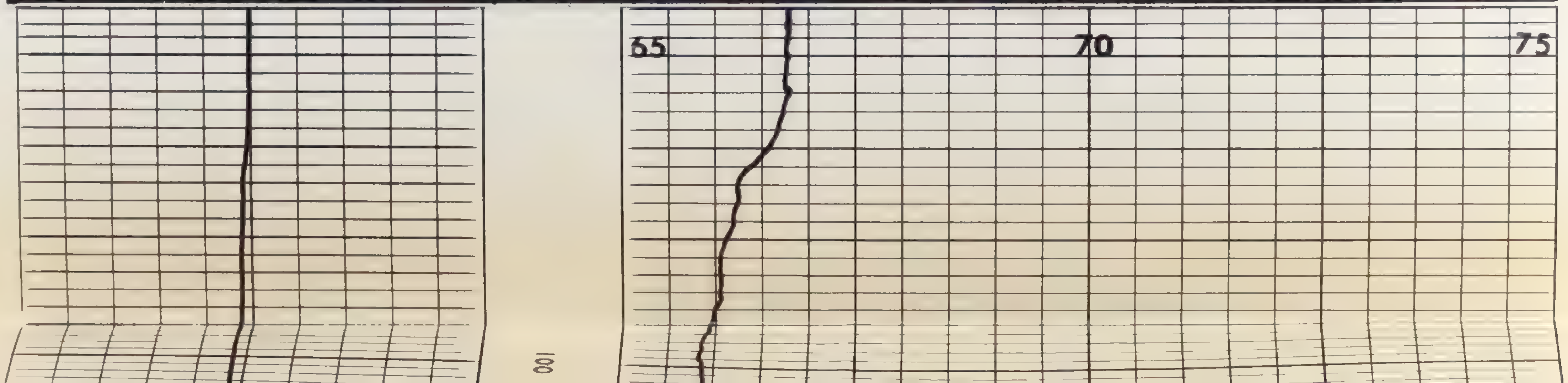
REMARKS: BIT SIZE:
9 5/8 0-64
7 7/8 64-1200
6 3/4 1200-2750

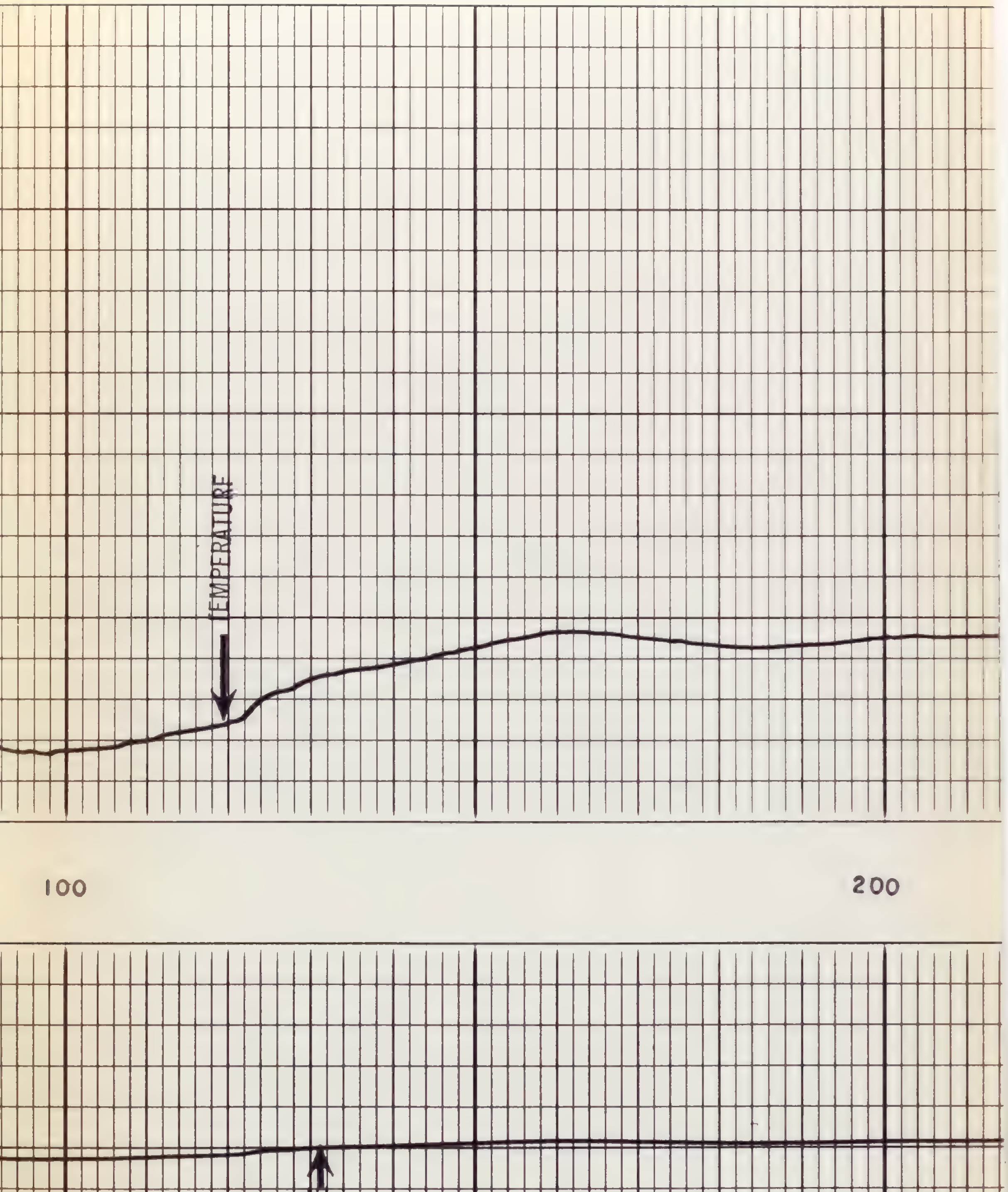
CEMENTATION DATA

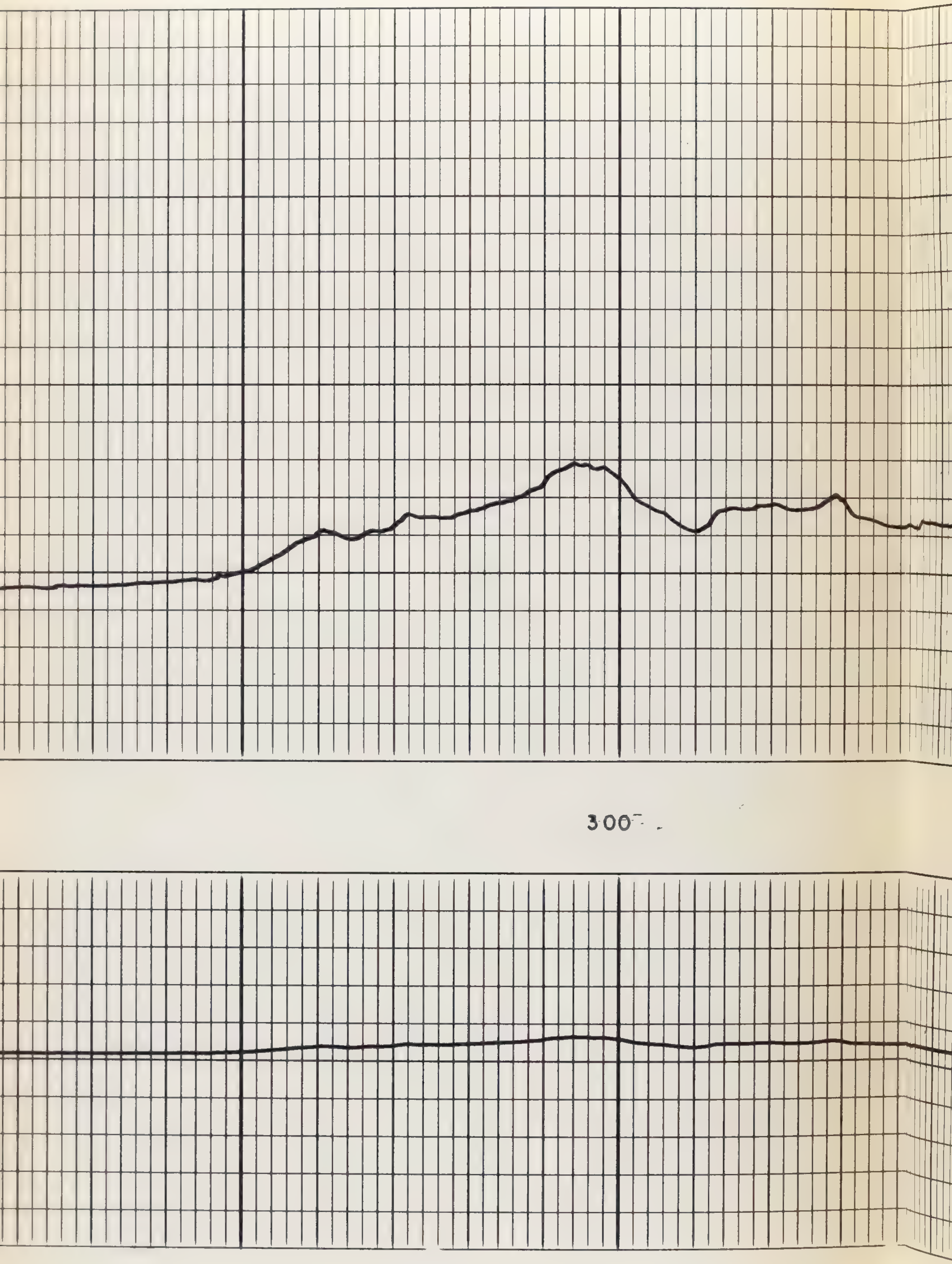
Date	Depth	Type of Cement	Nb of Sacks	Additives	Calculated Top

REDUCED SENSITIVITY TEMPERATURE

TEMPERATURE °F.




TEMPERATURE
100
200
REDUCED
TEMPERATURE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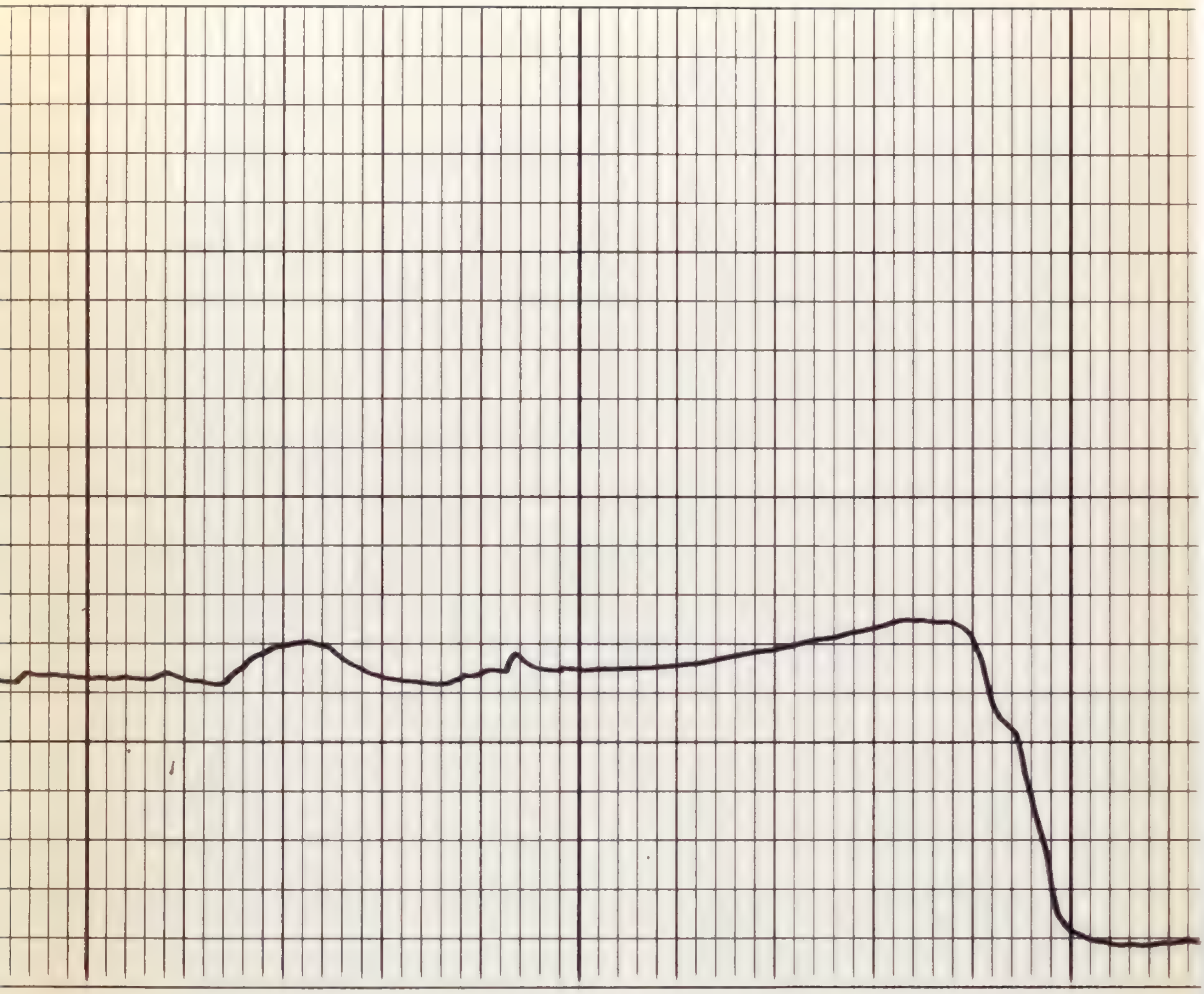

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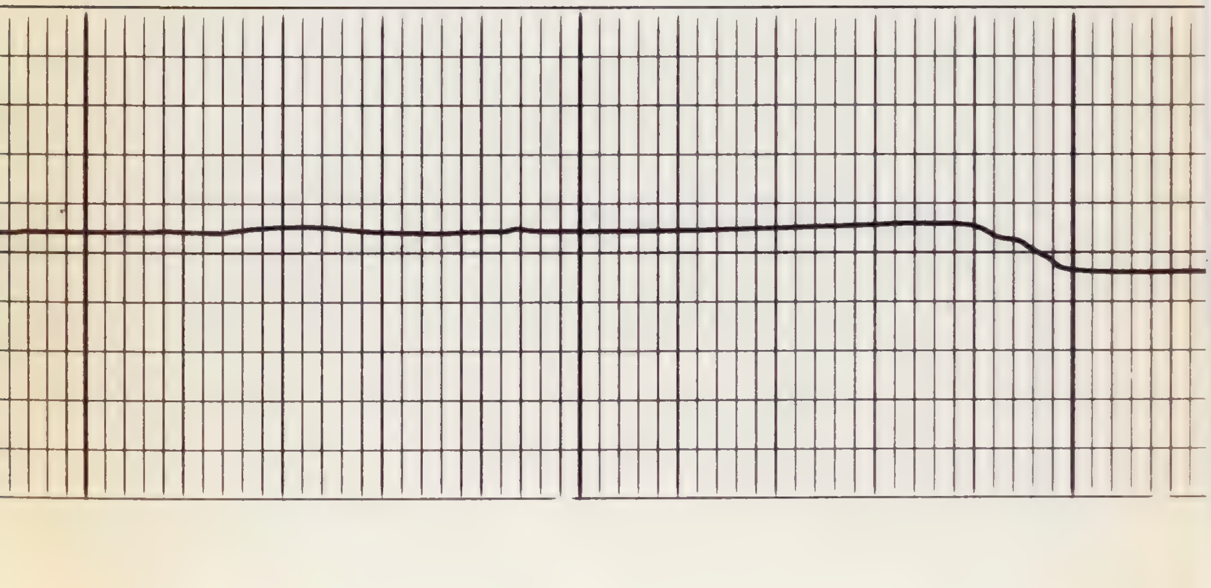
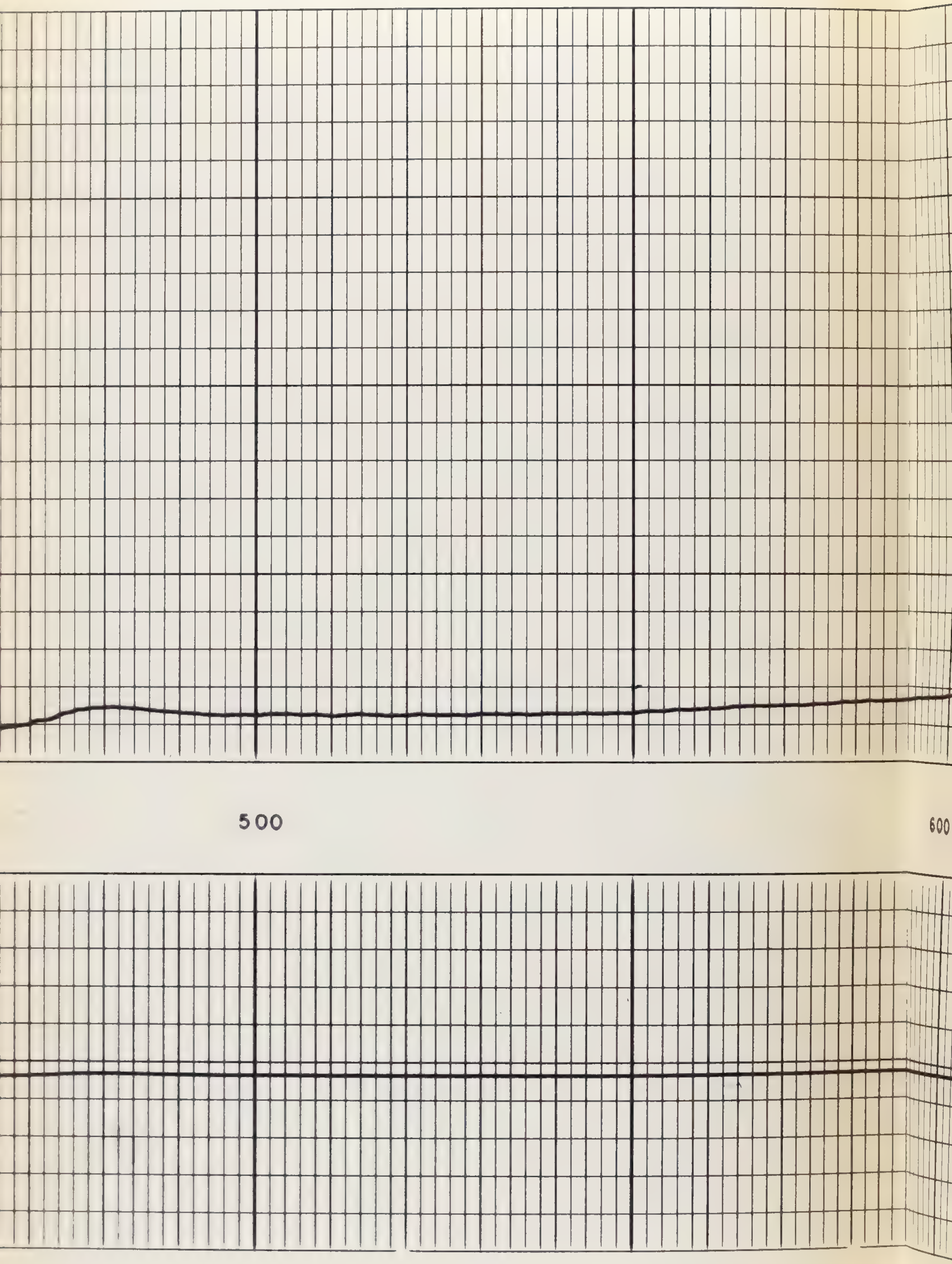
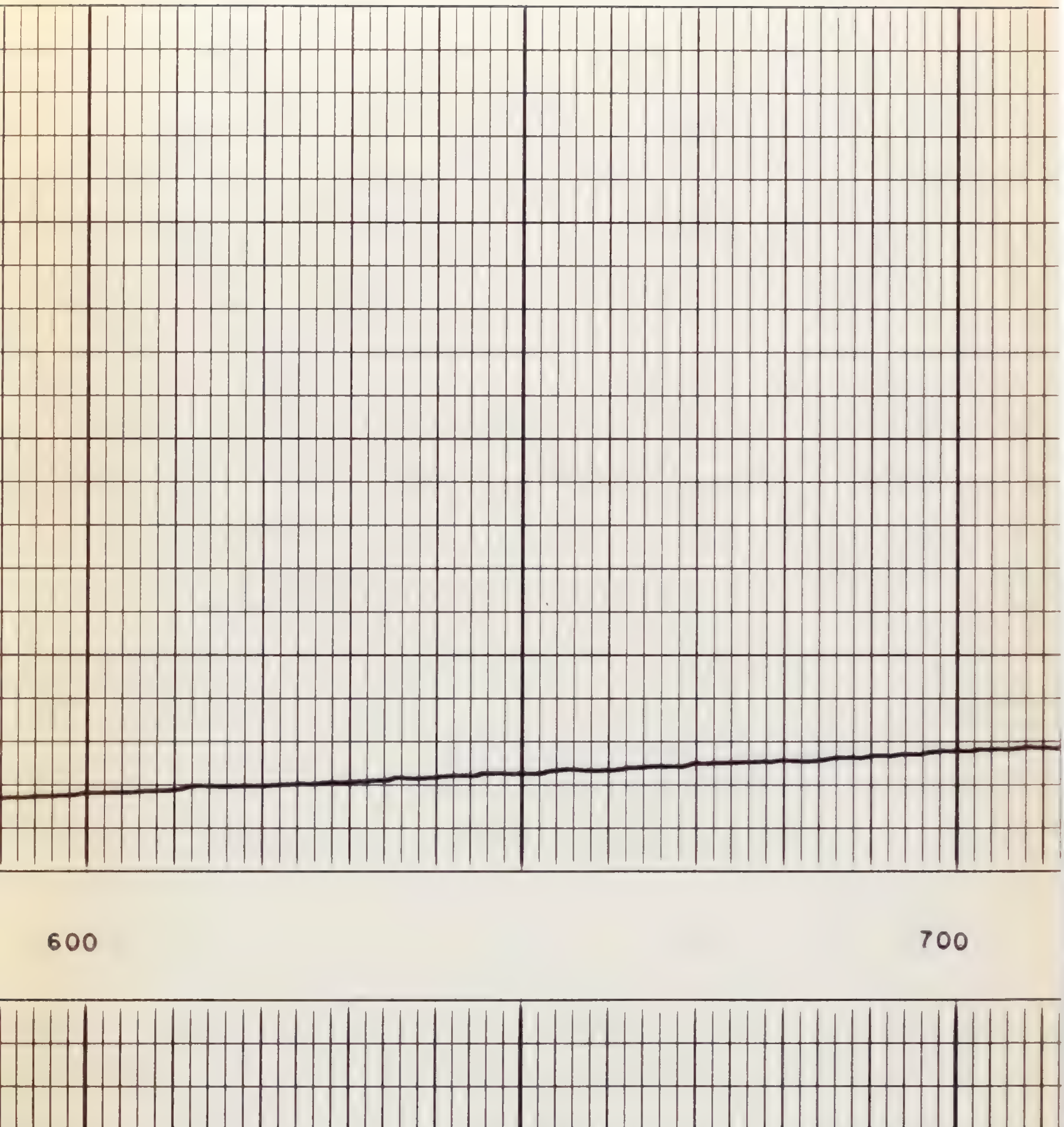



500
600


600
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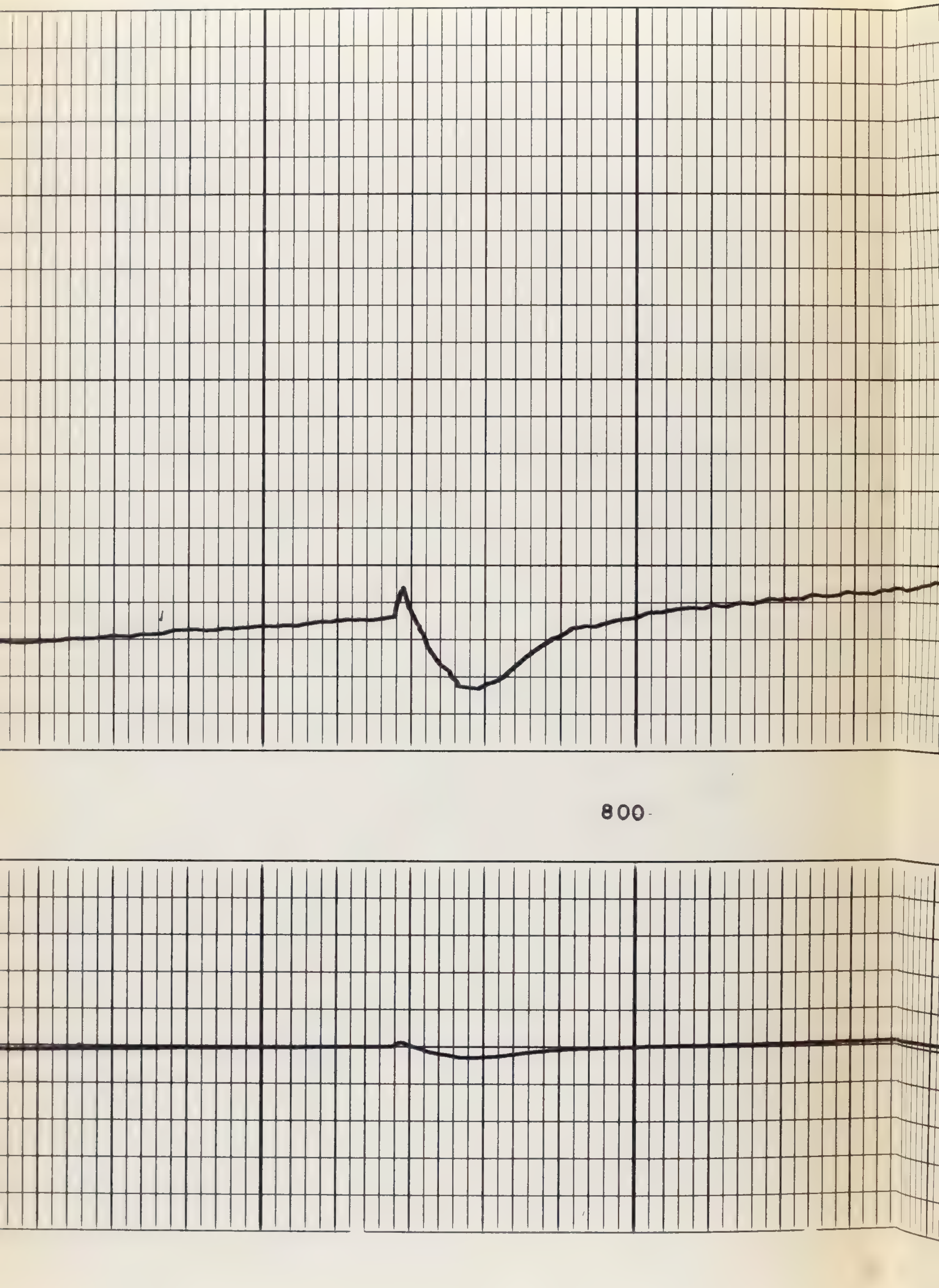
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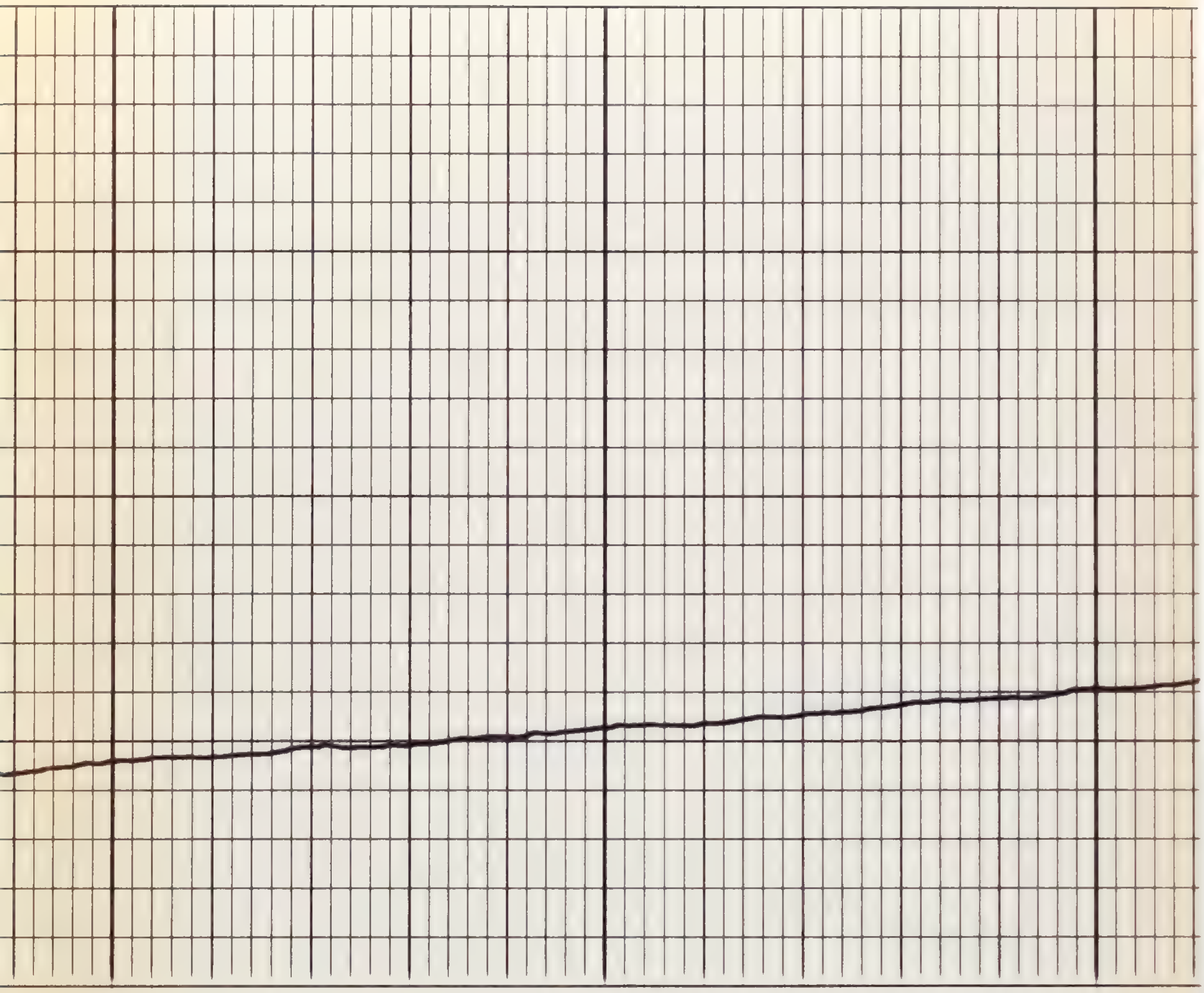
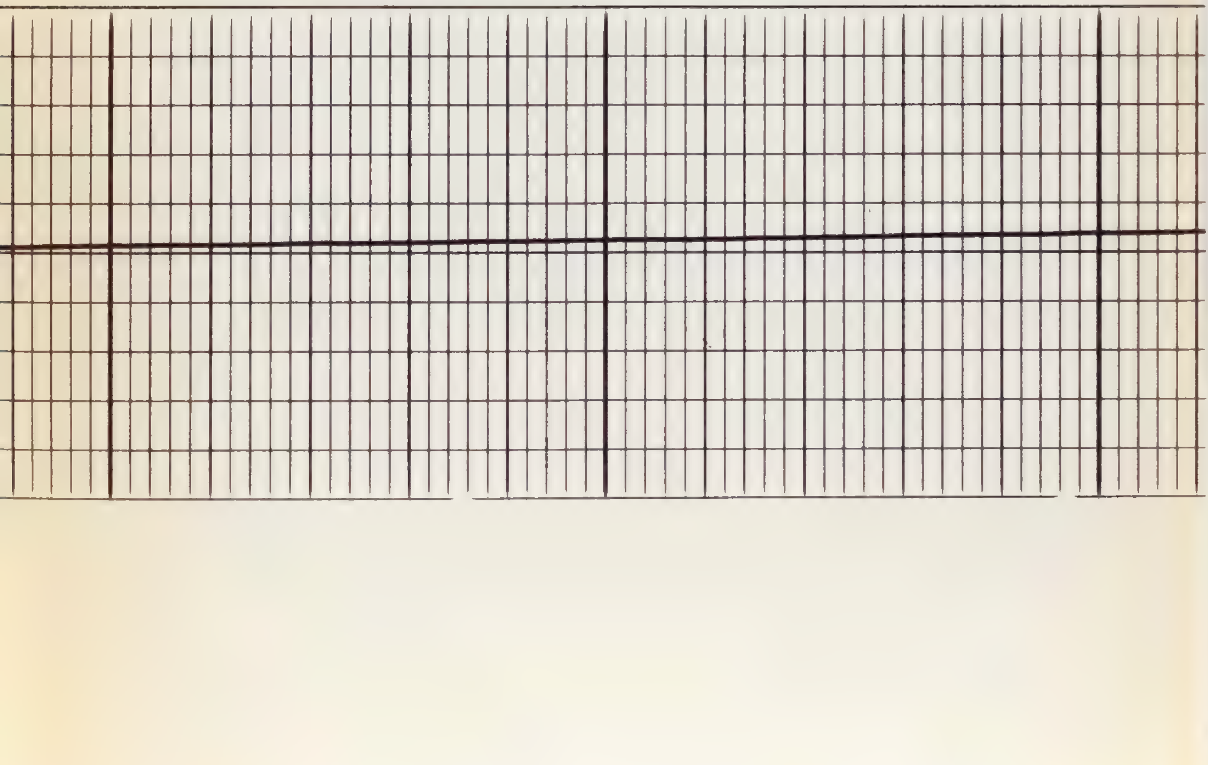
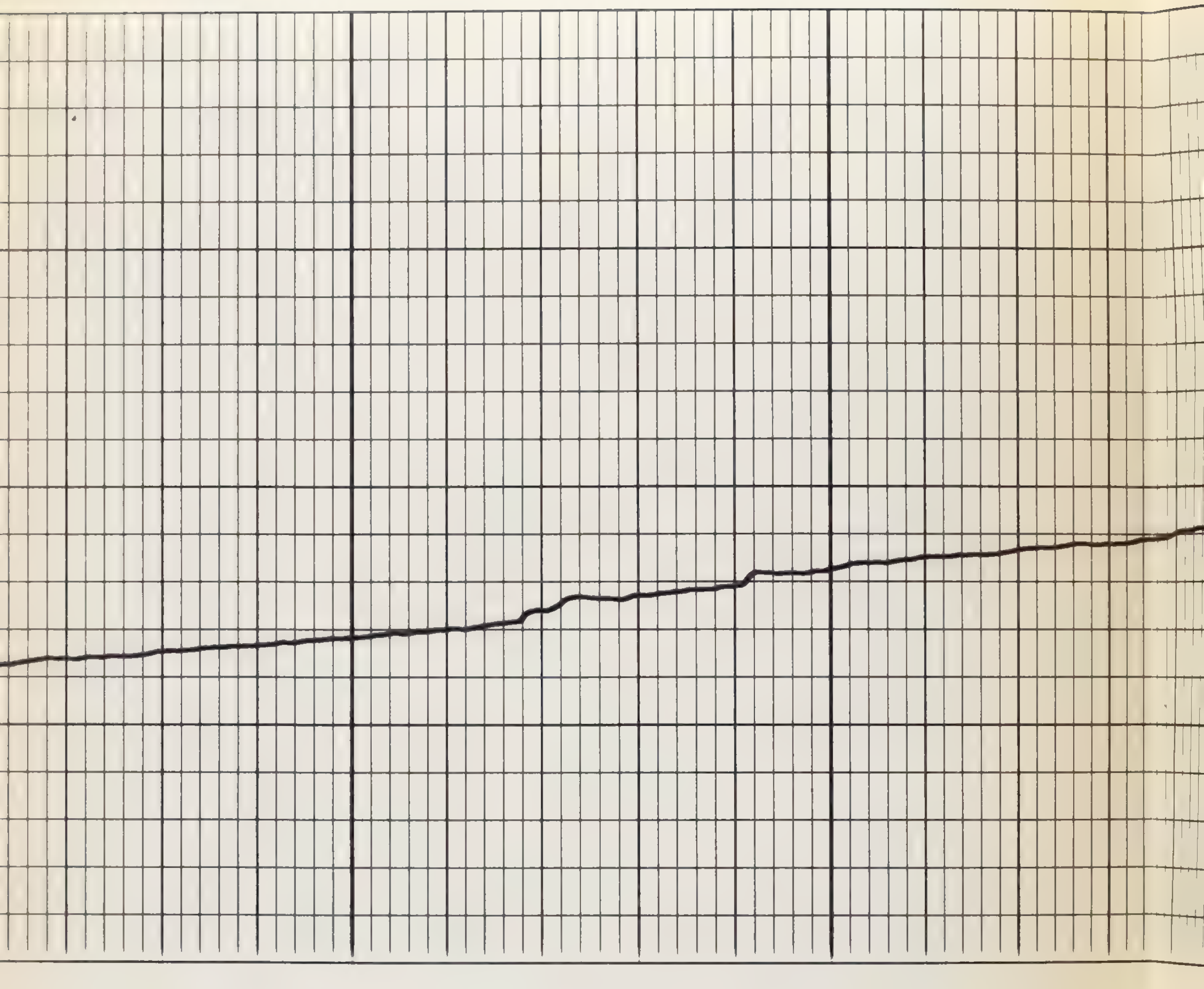


900

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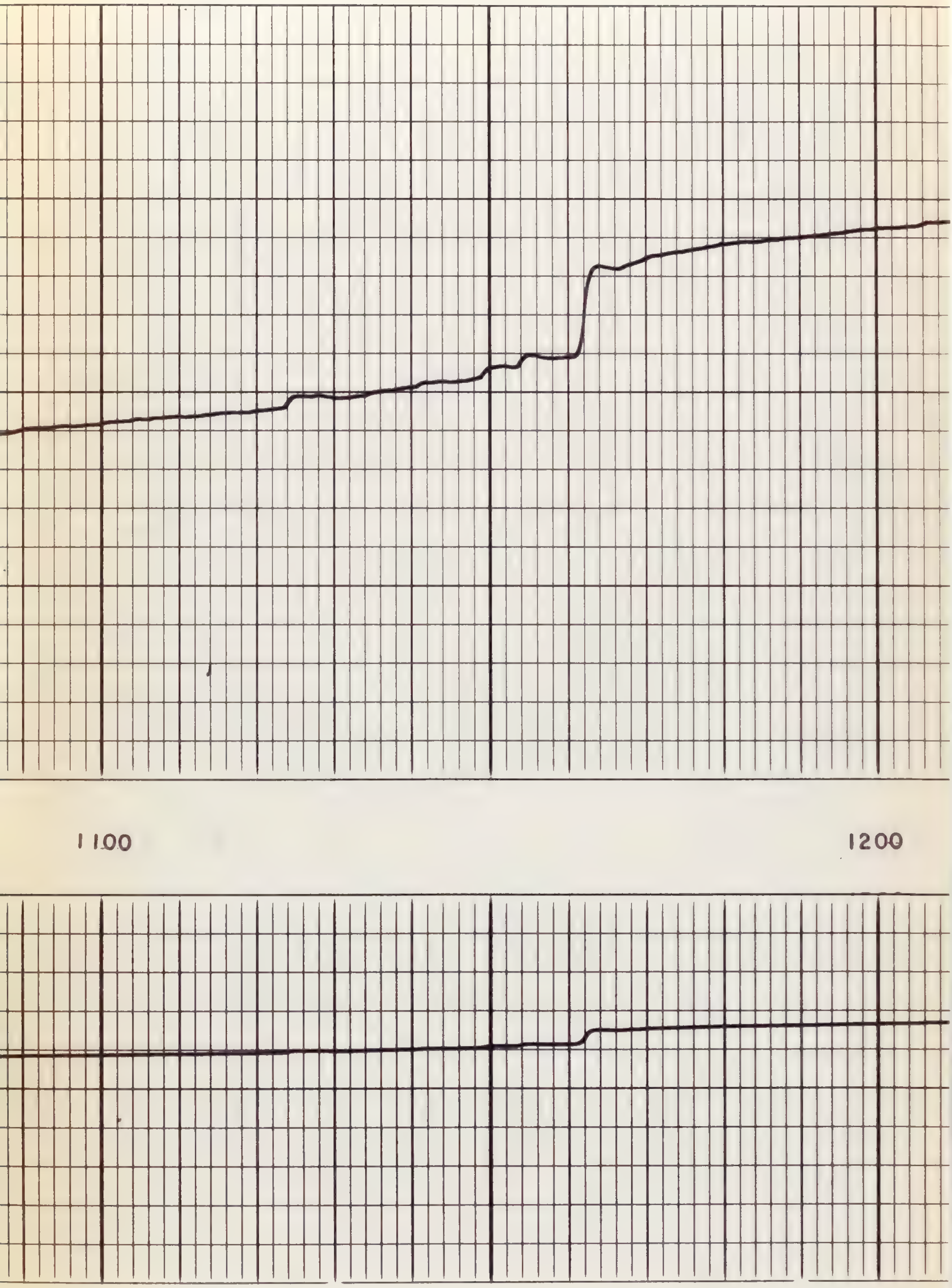
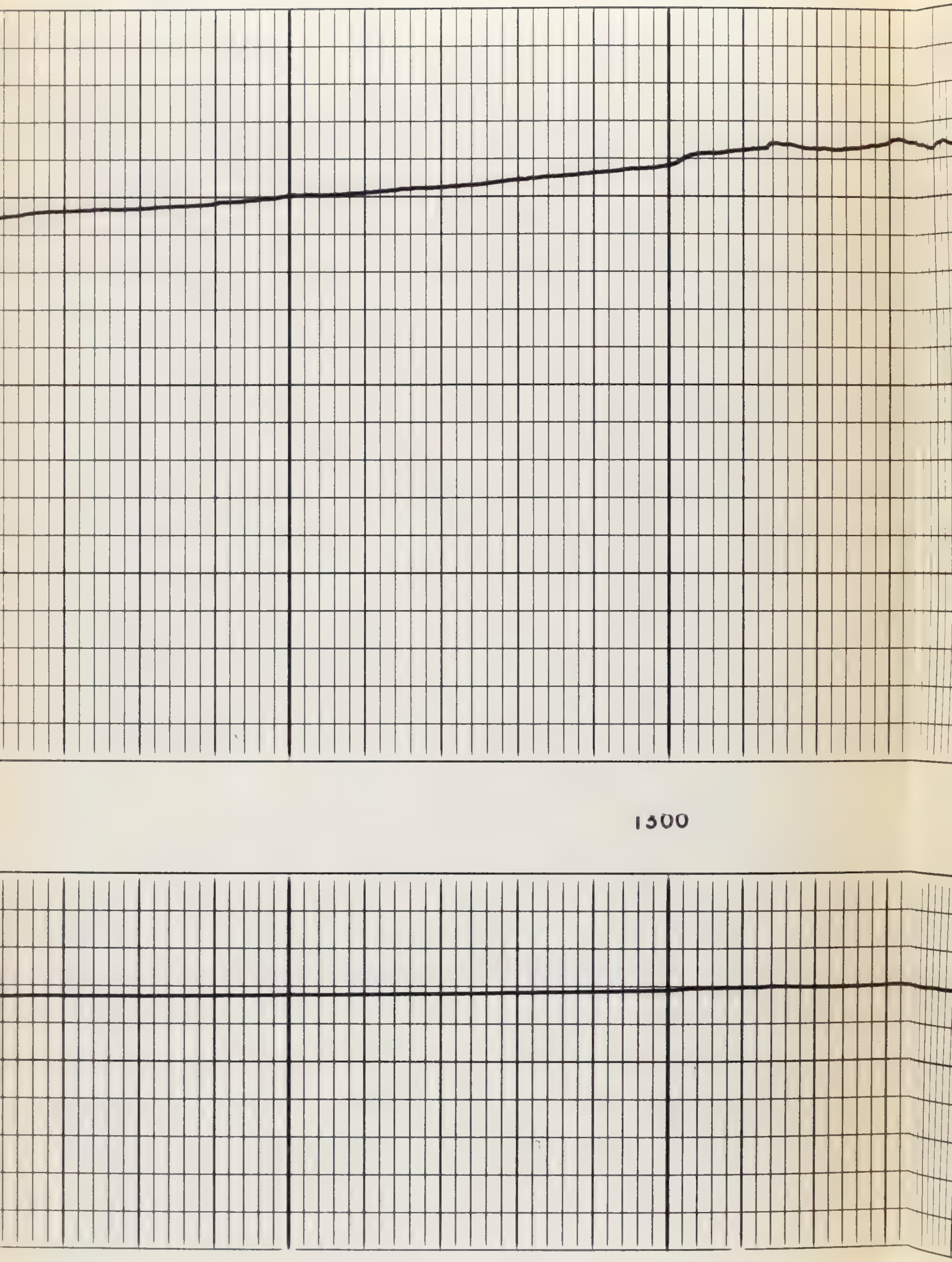

1100
1200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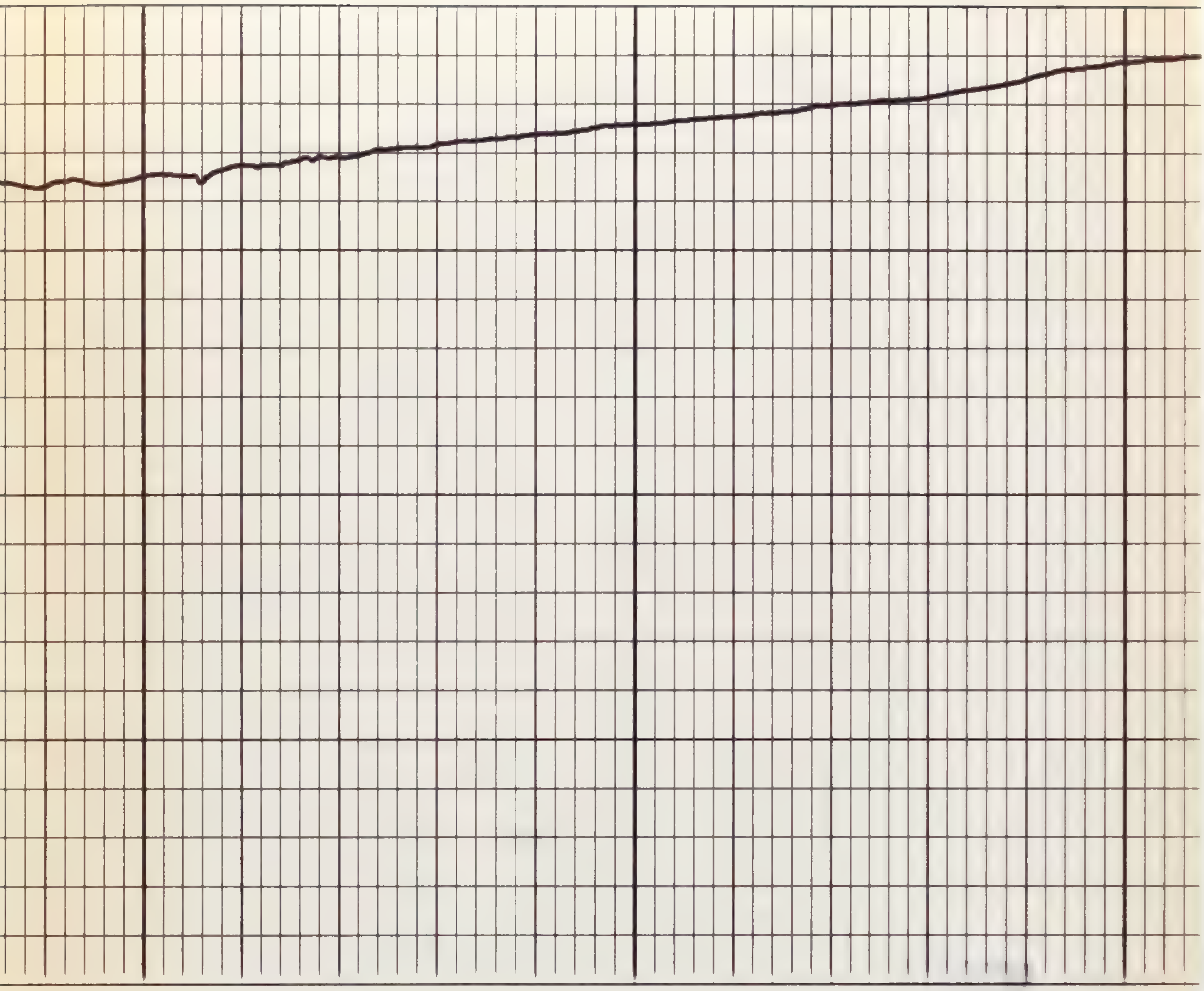
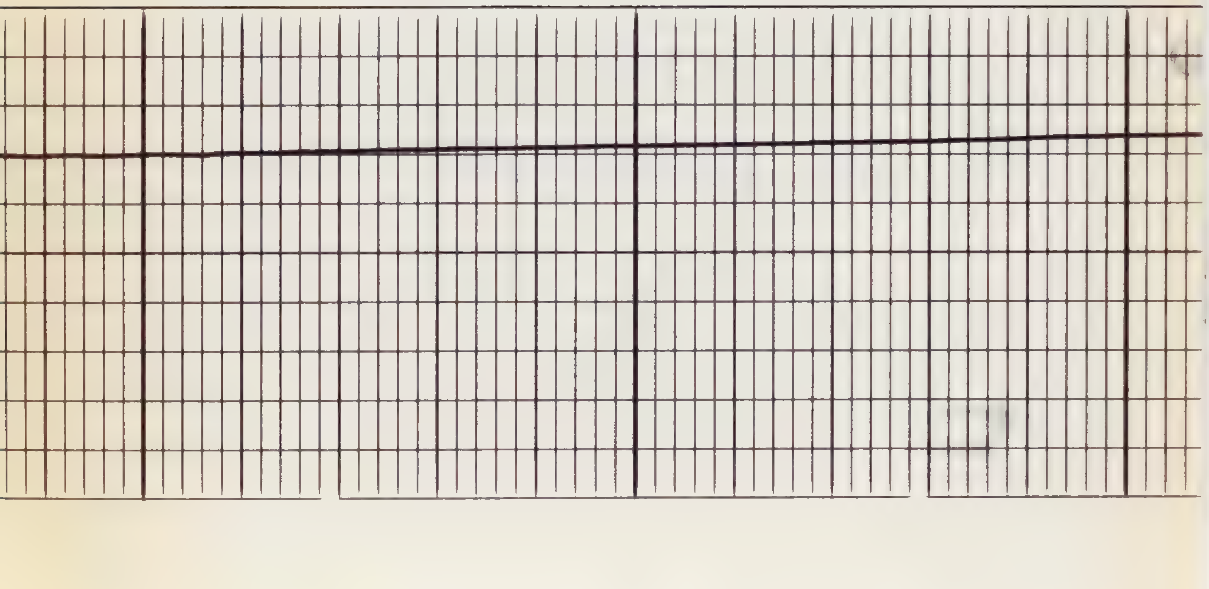
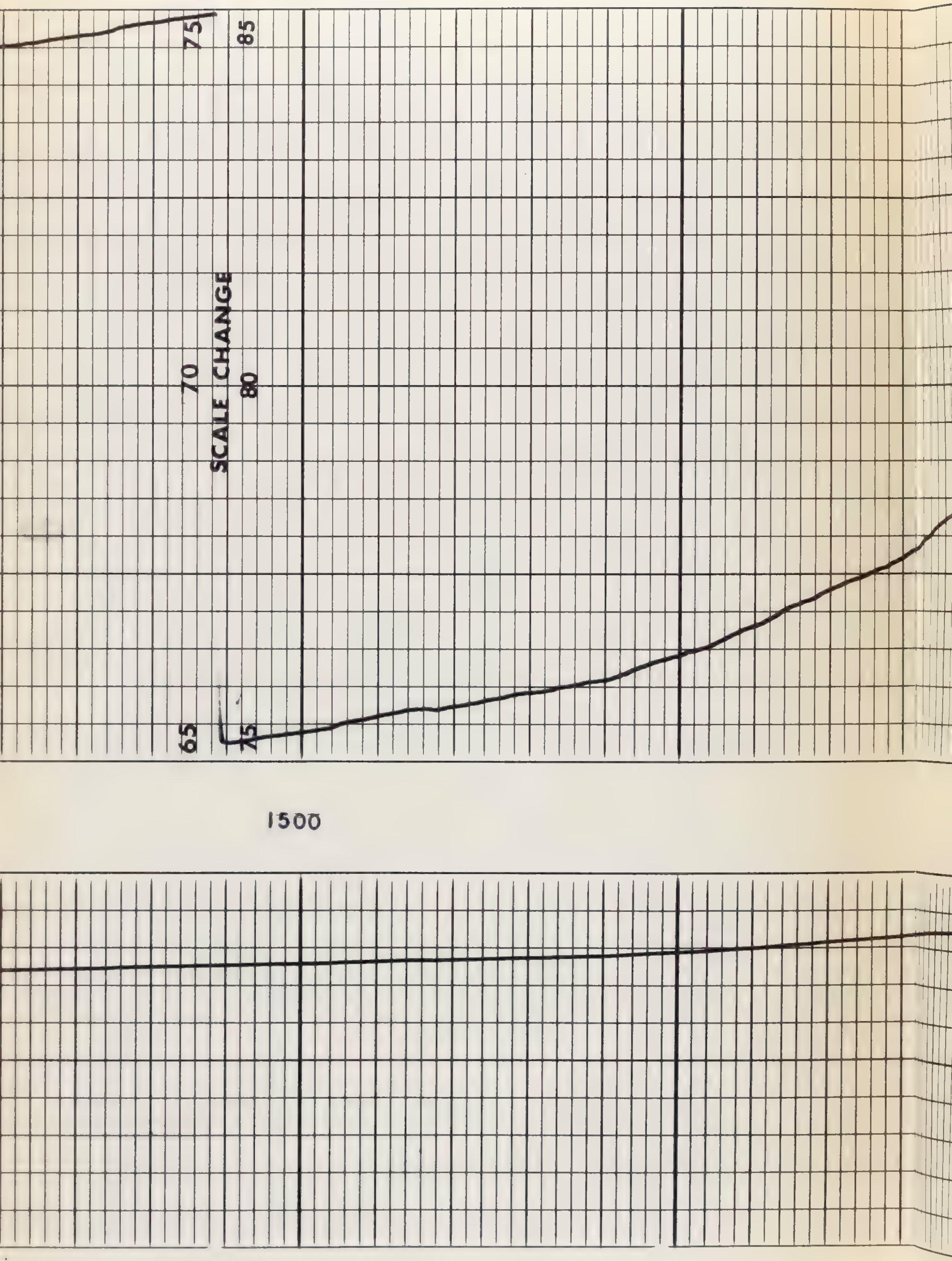
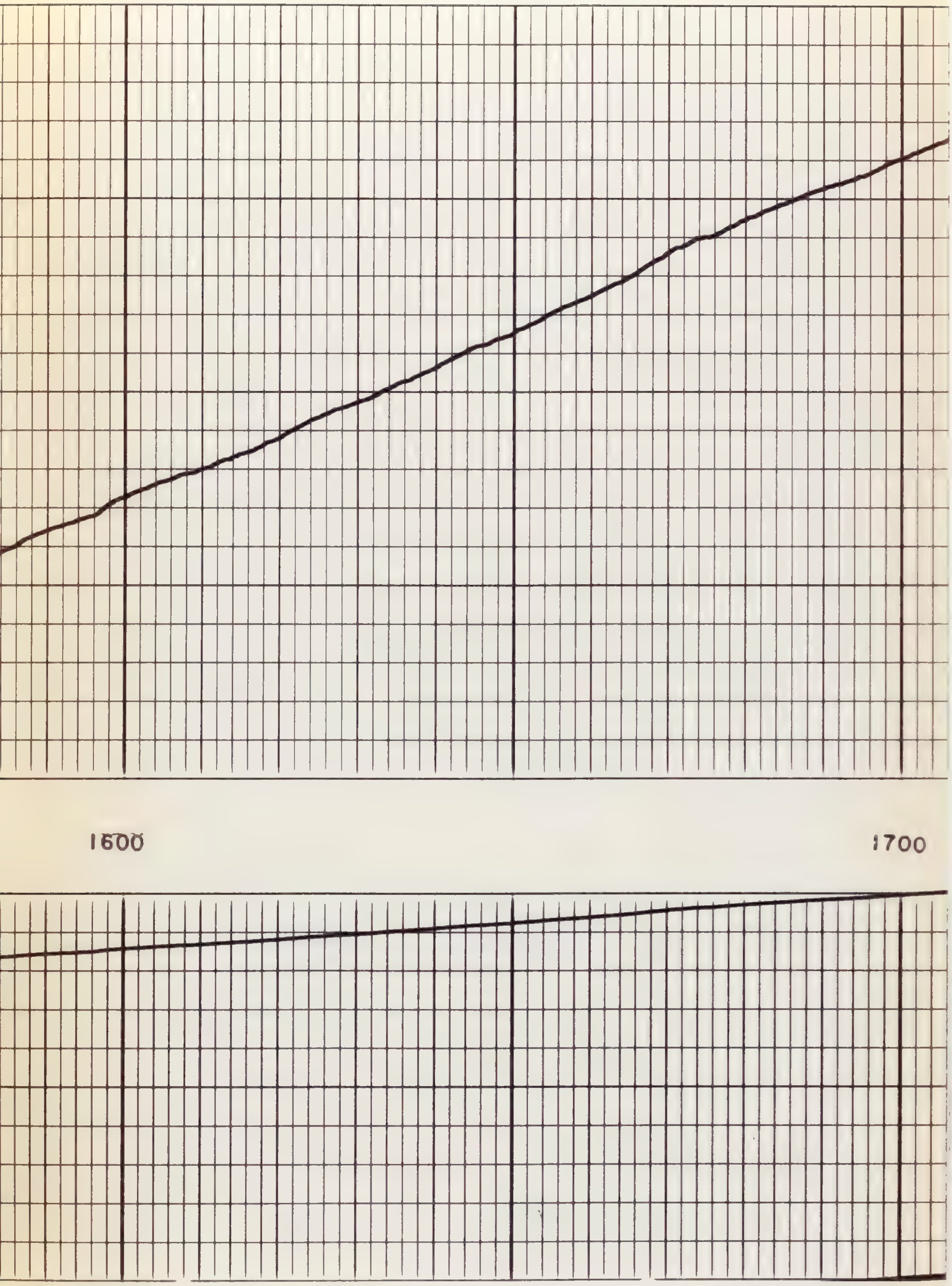
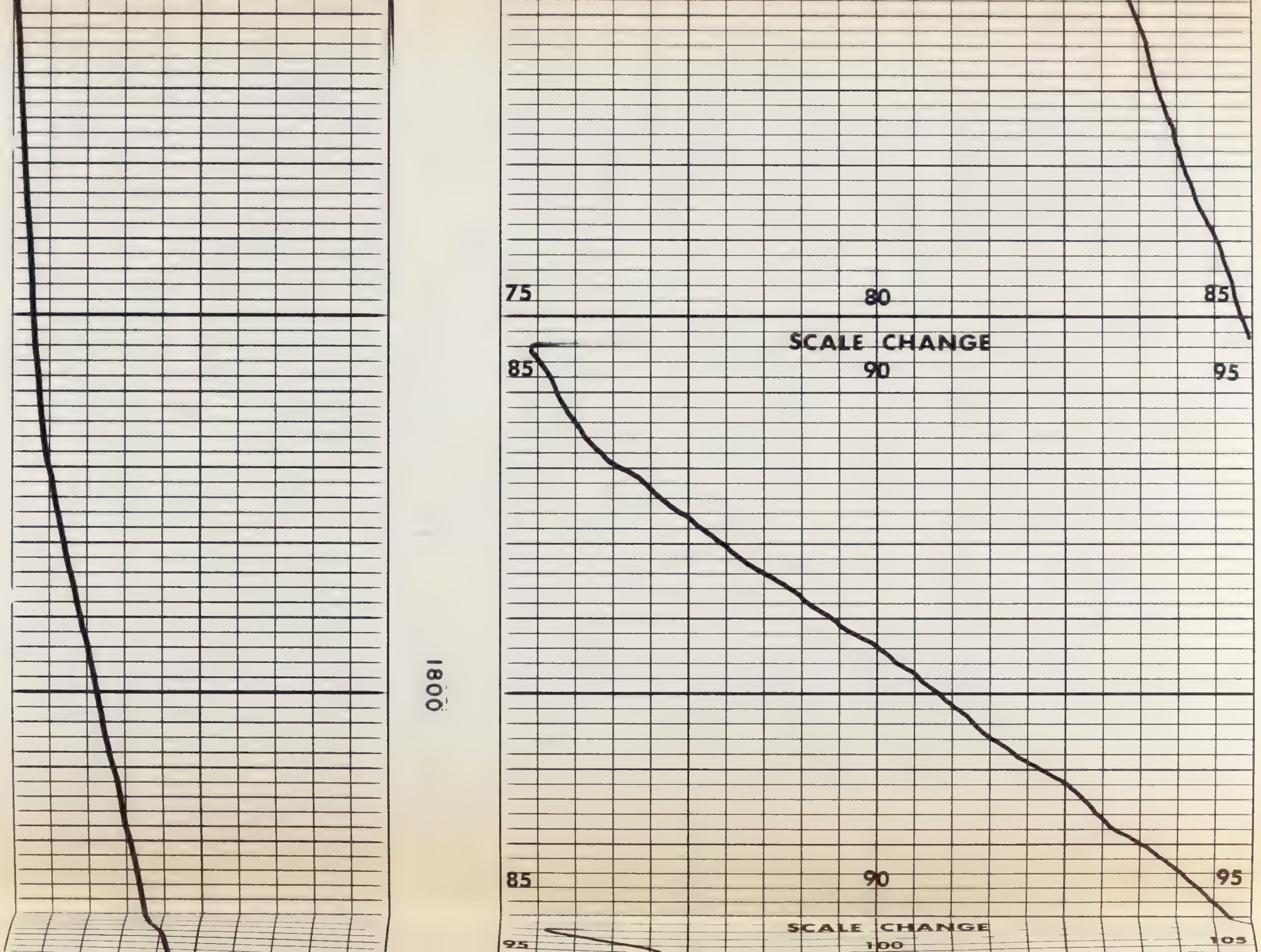


1400




75
85
70
SCALE CHANGE
80
65
75
1500


1600
1700


75
80
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SCALE CHANGE
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90
95
1800
85
90
95
SCALE CHANGE
95
100
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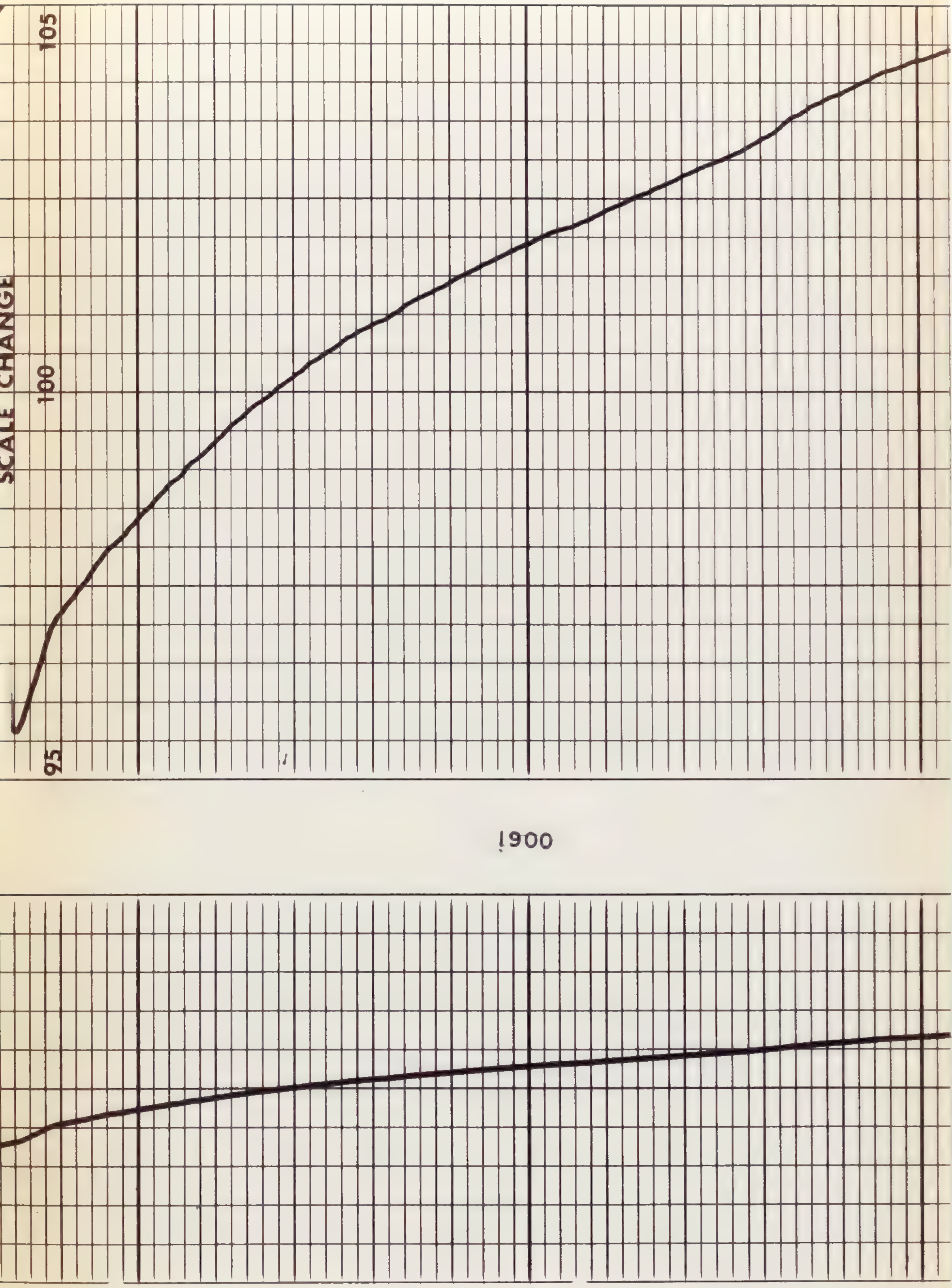
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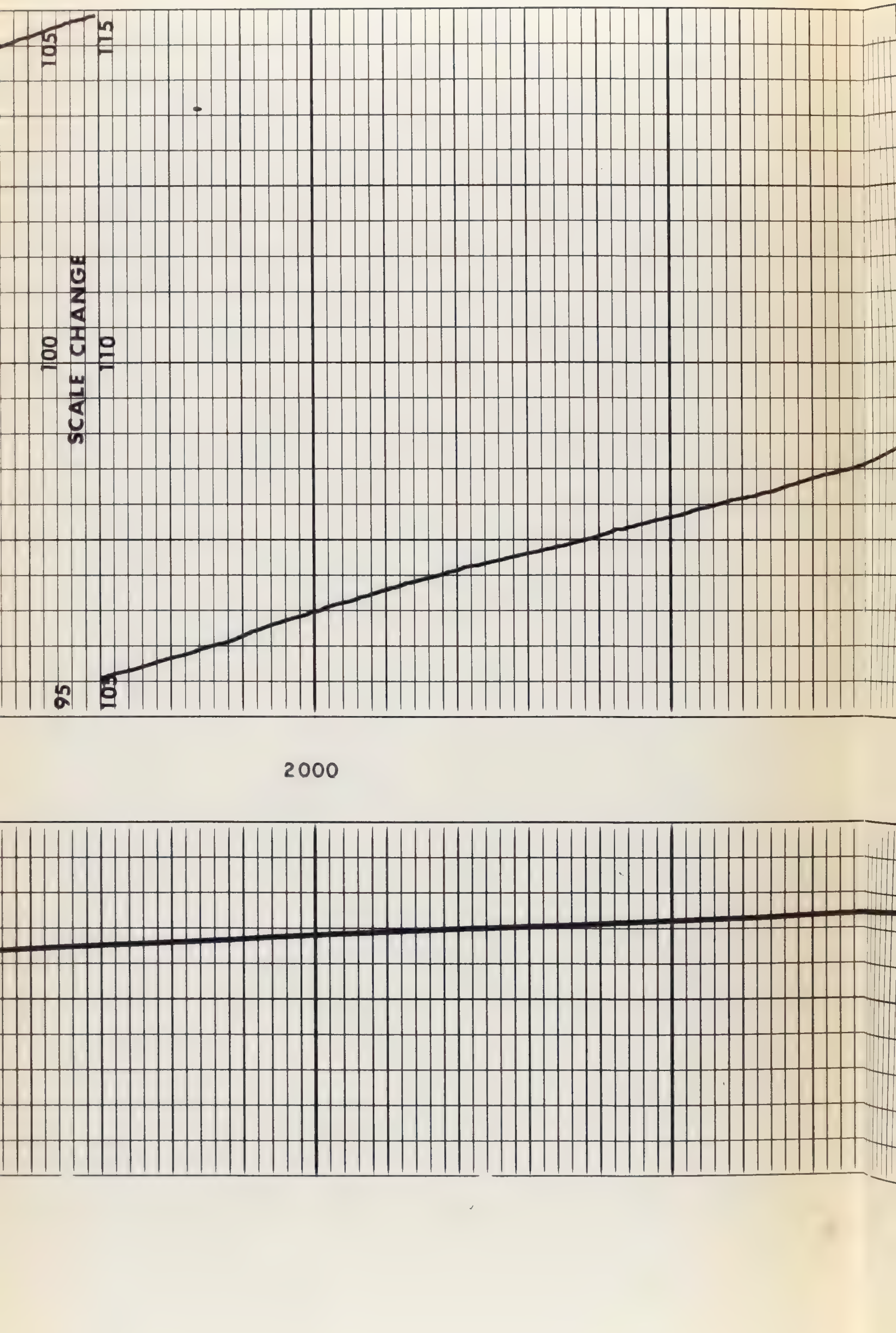
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100
SCALE CHANGE
110
95
105
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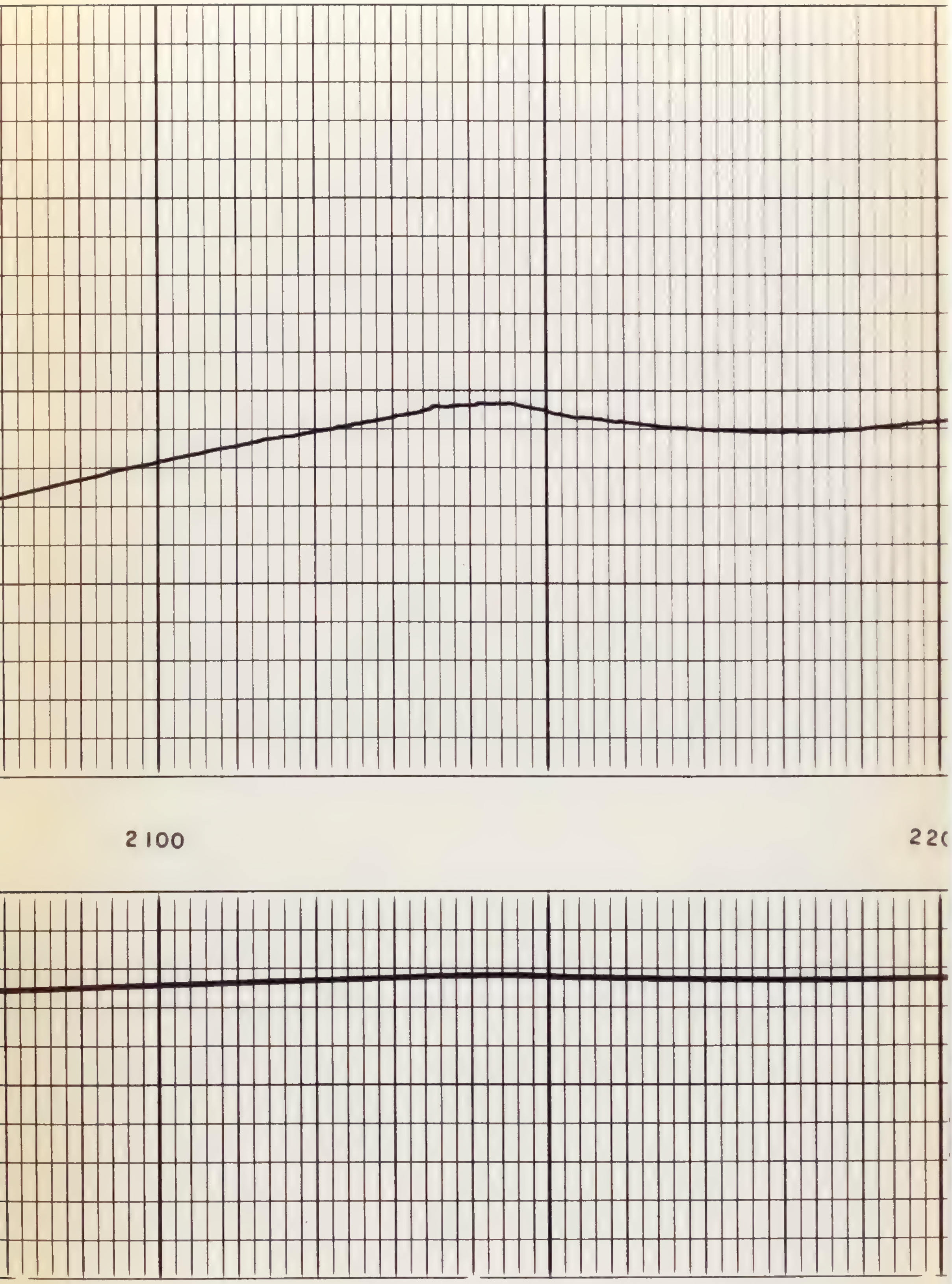
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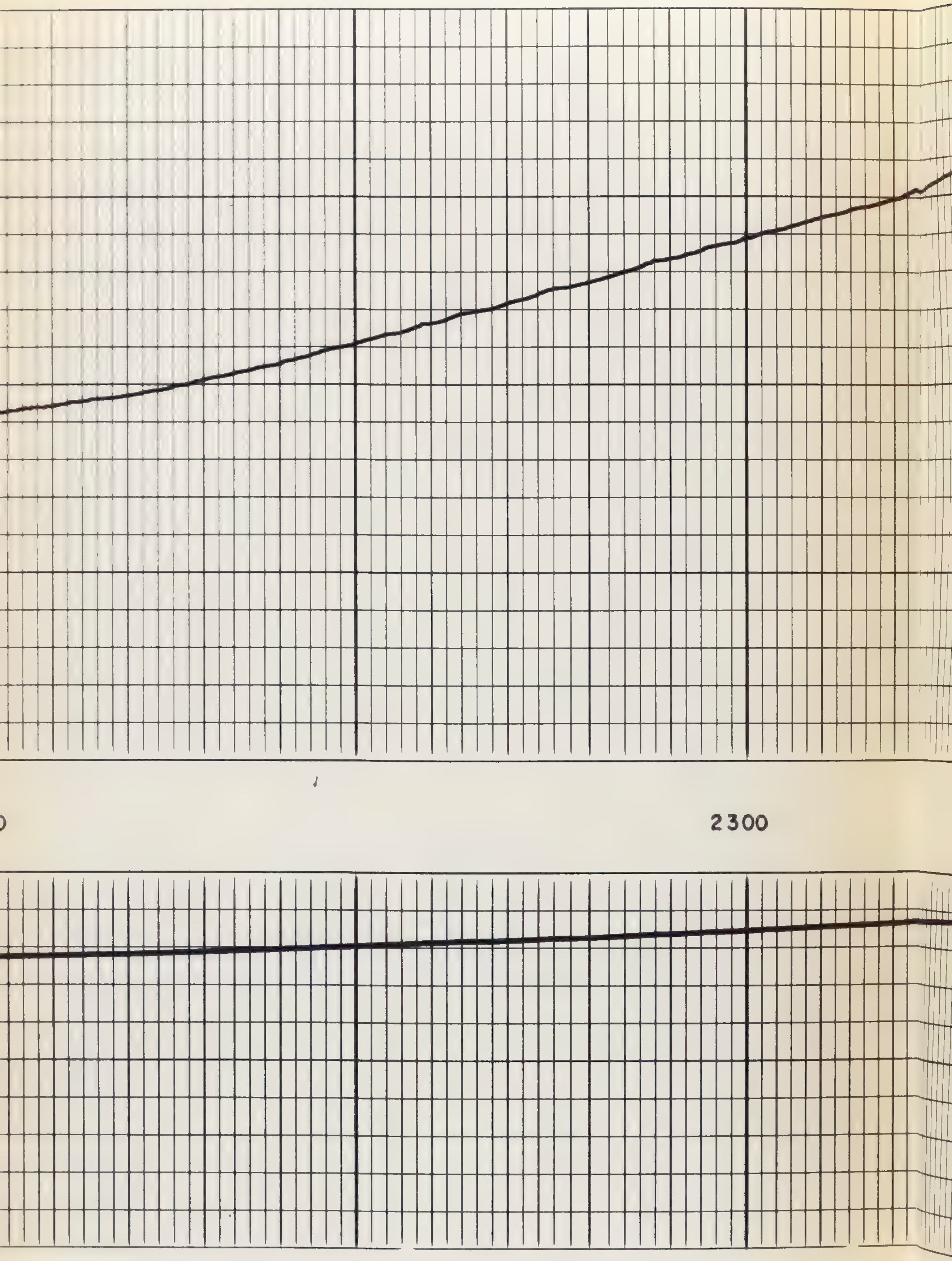
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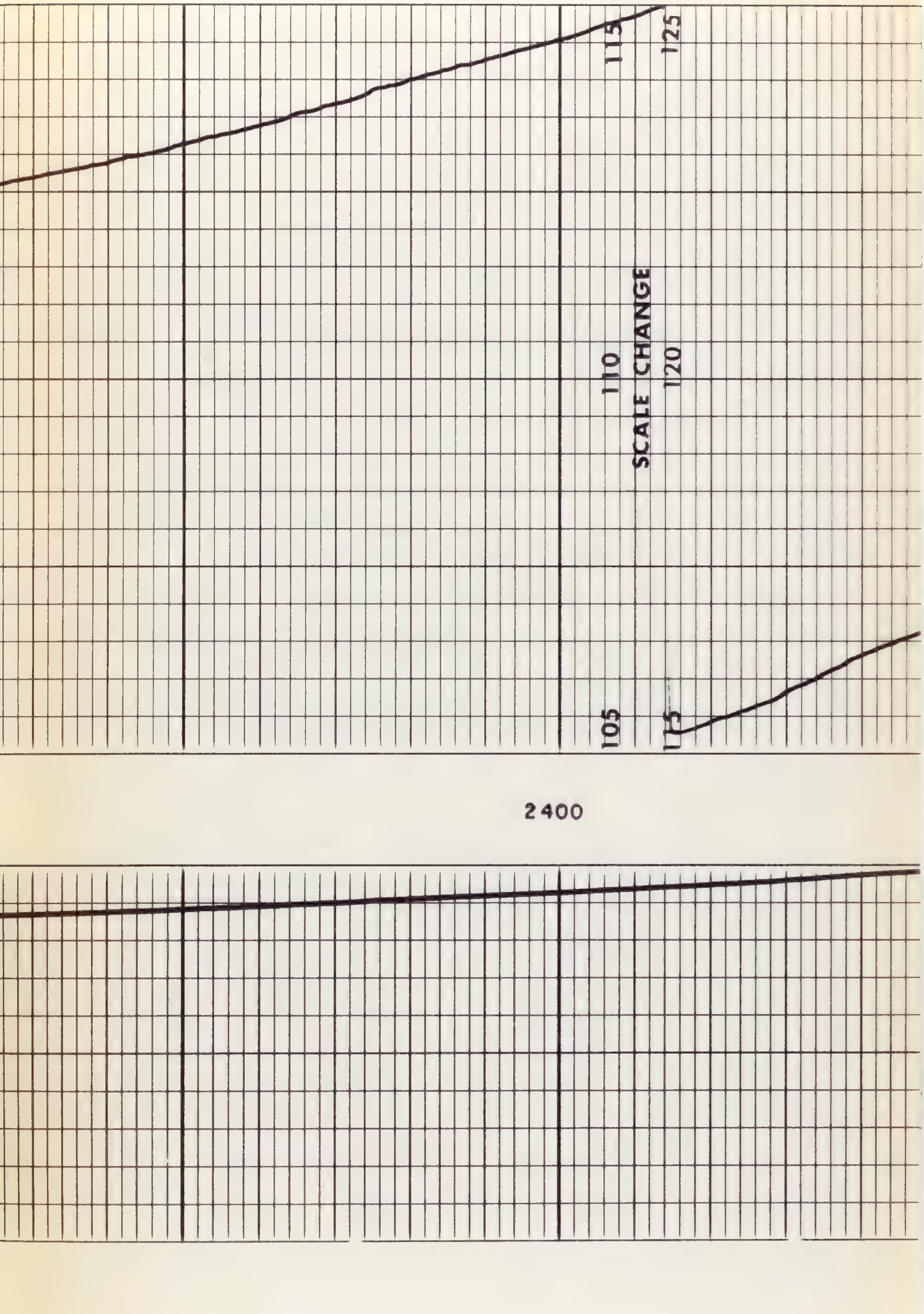
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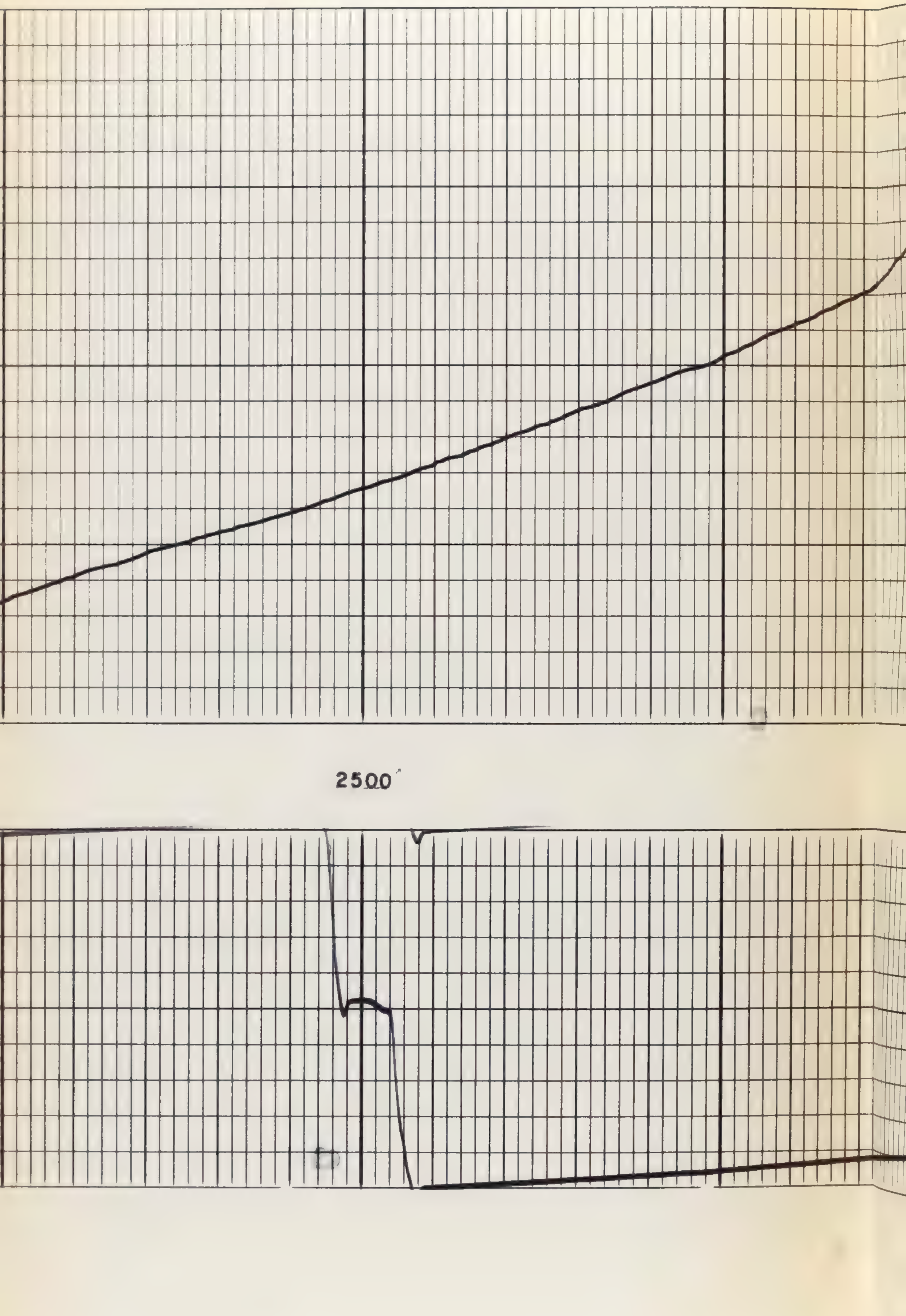
125
110
SCALE CHANGE
120
105
115
2400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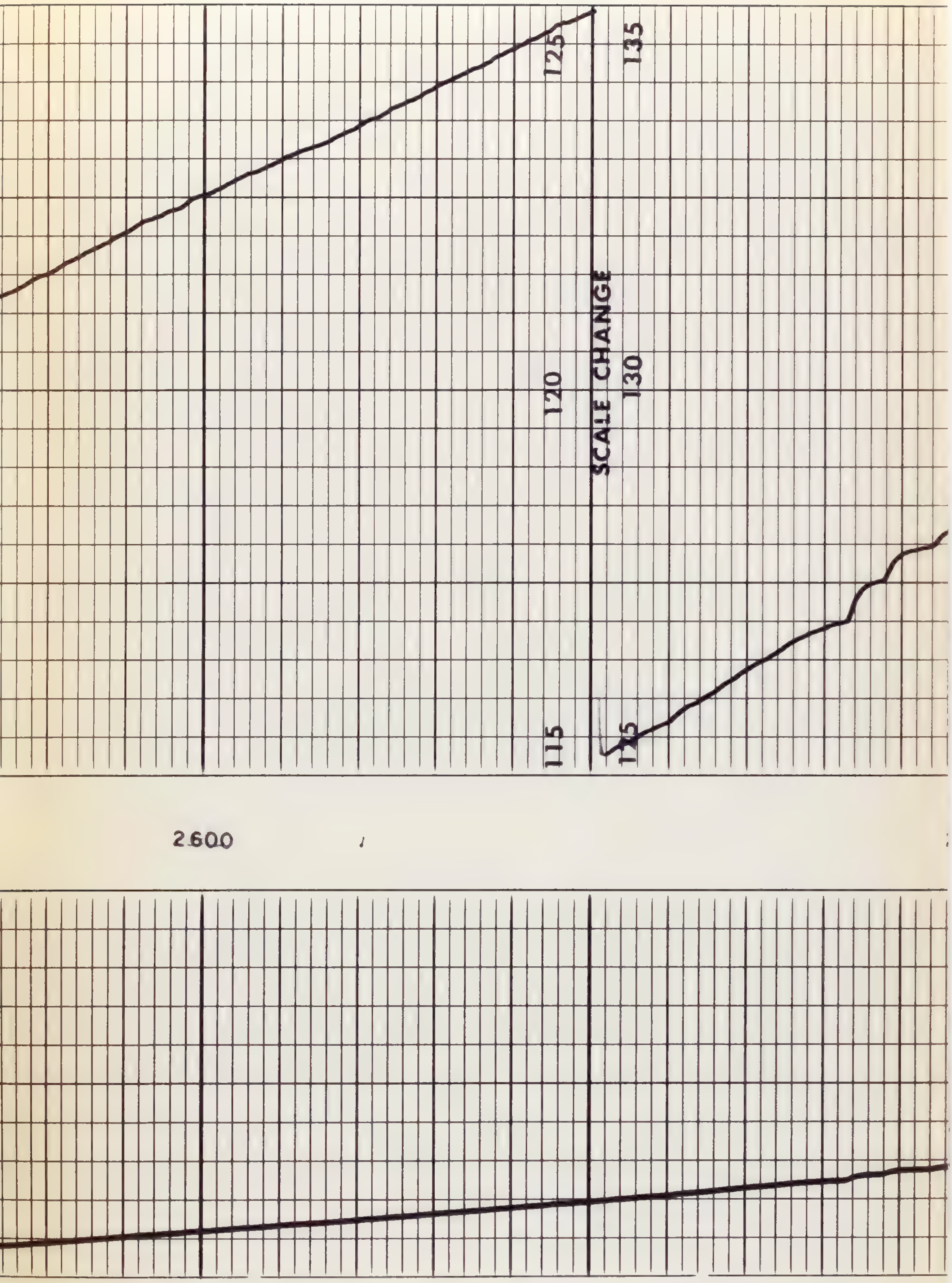
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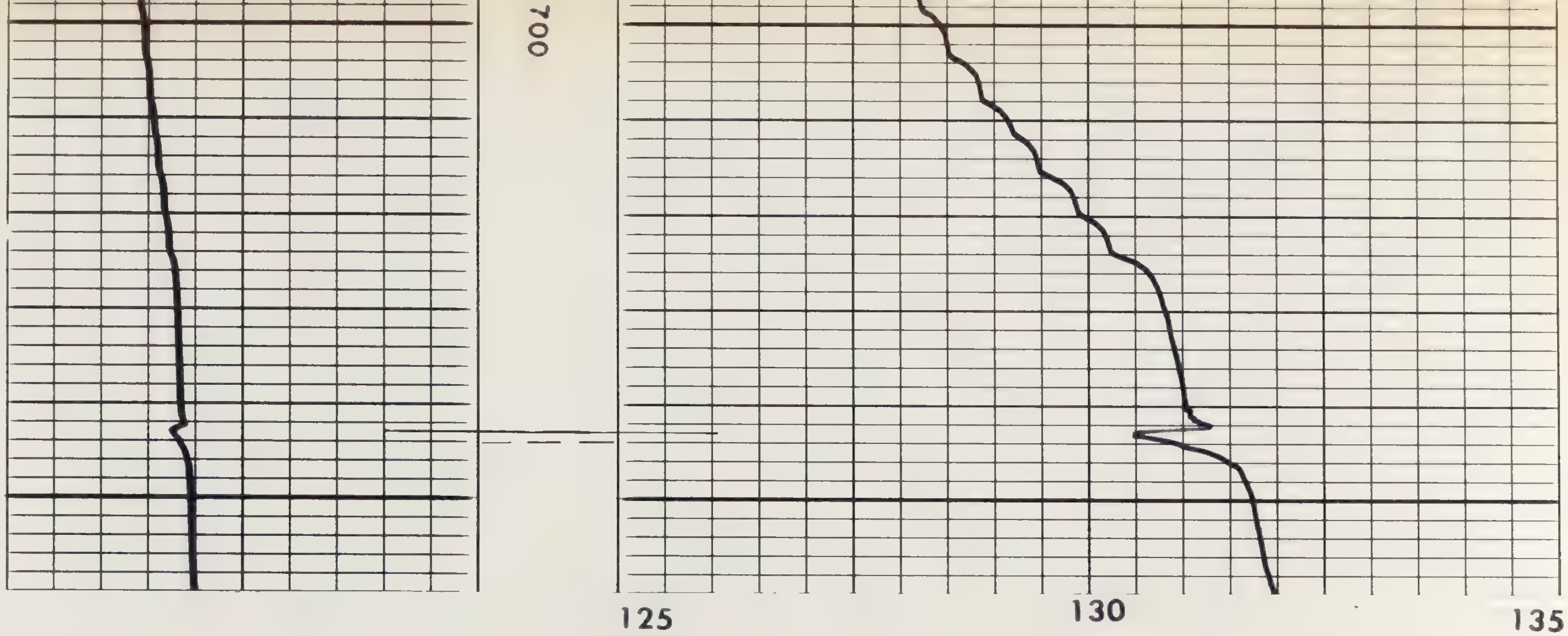
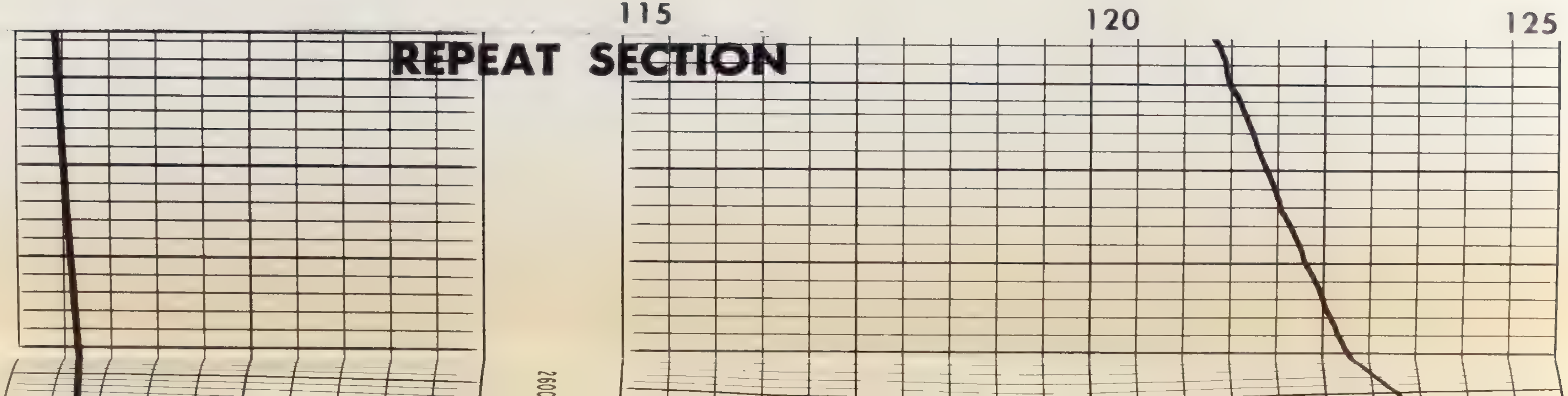
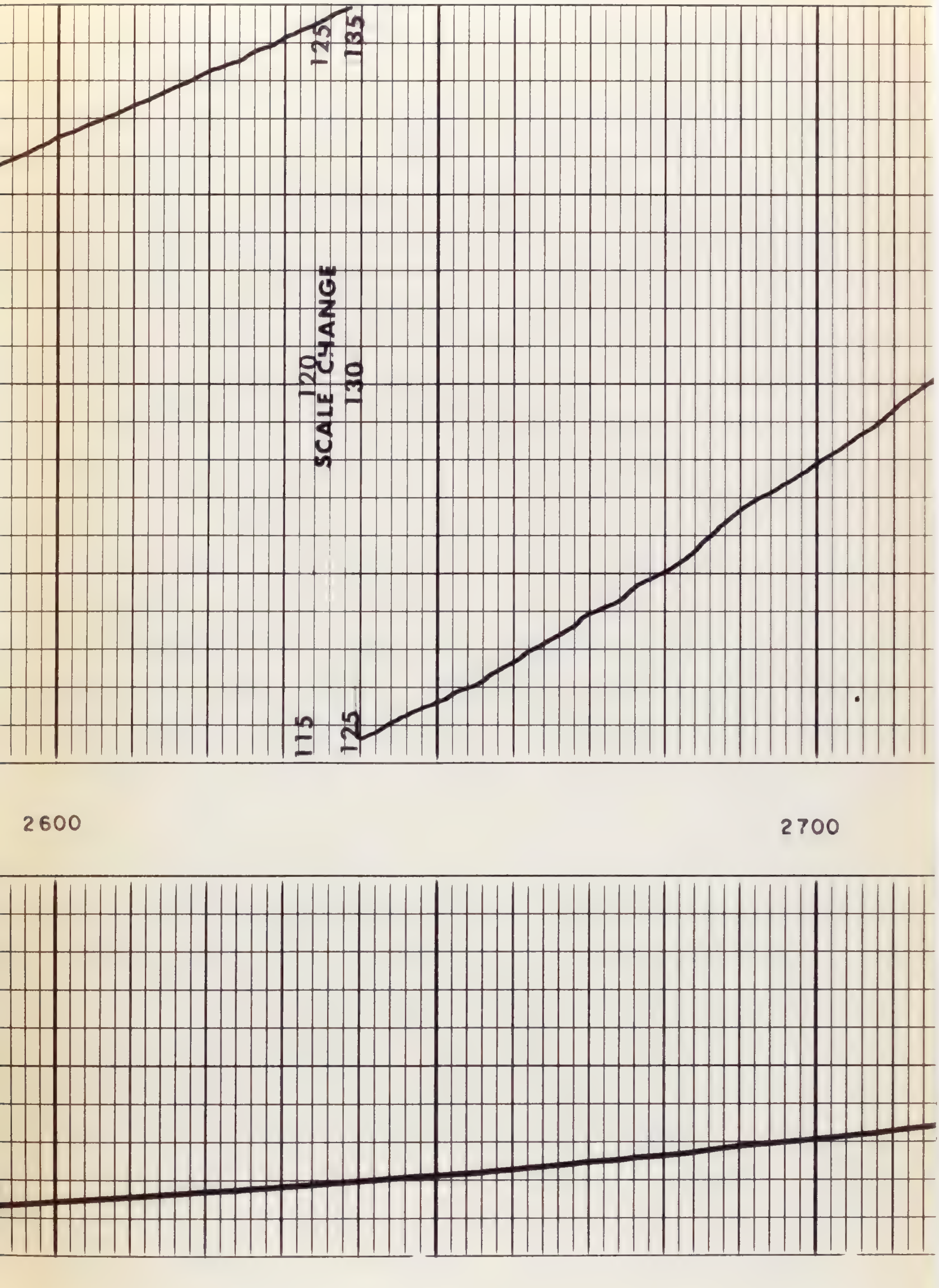
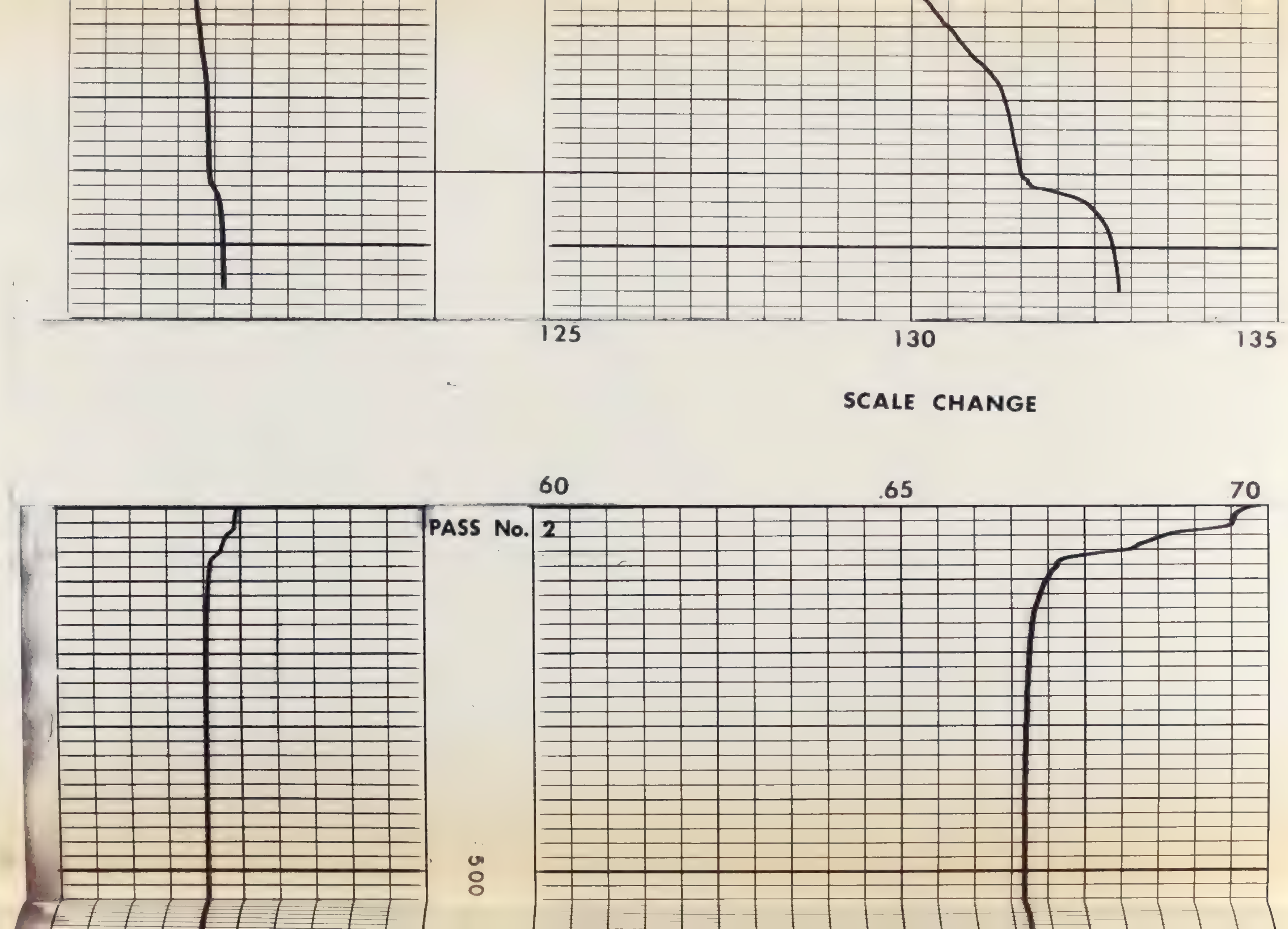
120
125
SCALE CHANGE
125
130
135
2600





REPEAT SECTION


125
135
120
SCALE CHANGE
130
115
125
2600
2700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130
135
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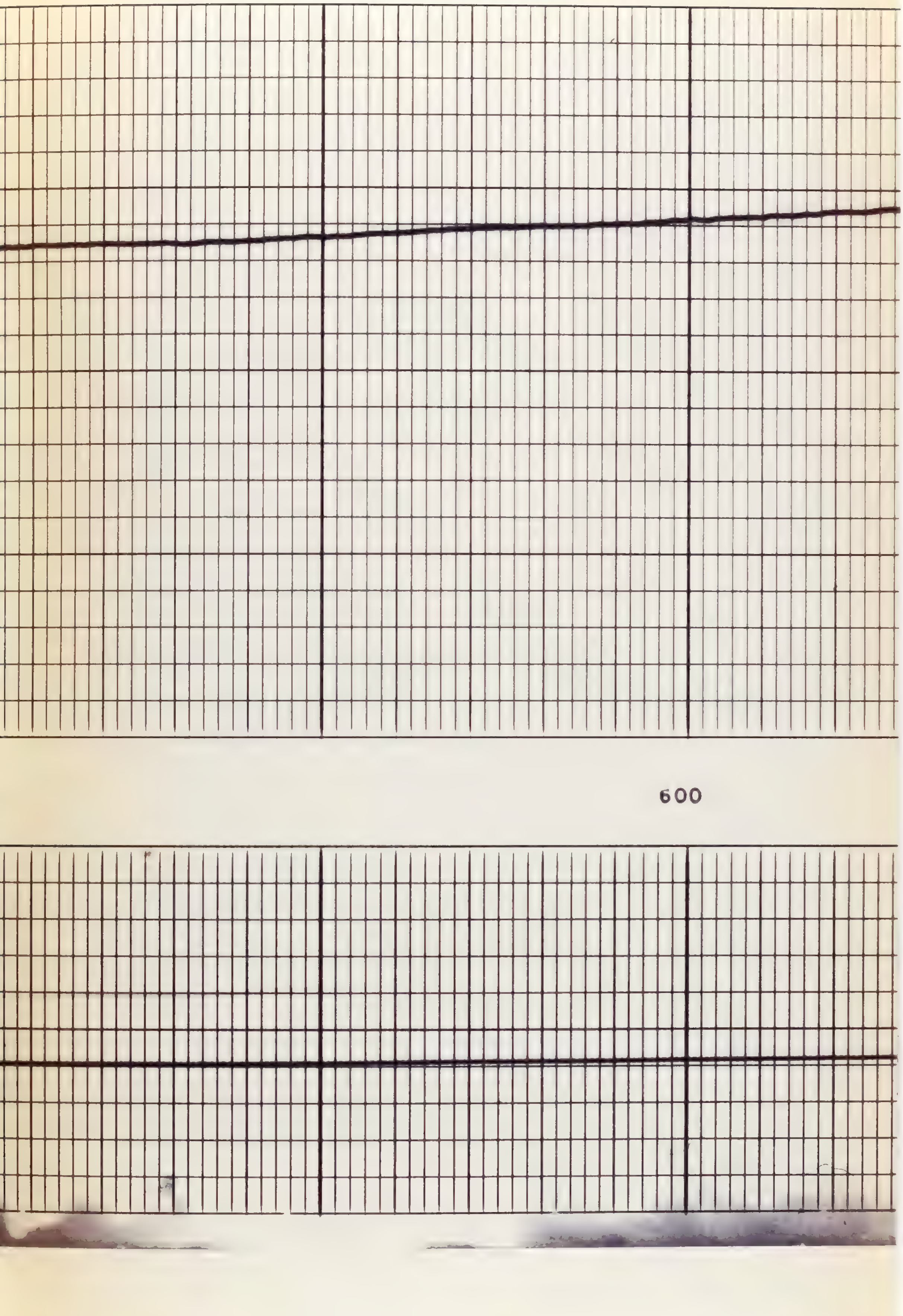
.65
70
PASS No. 2
500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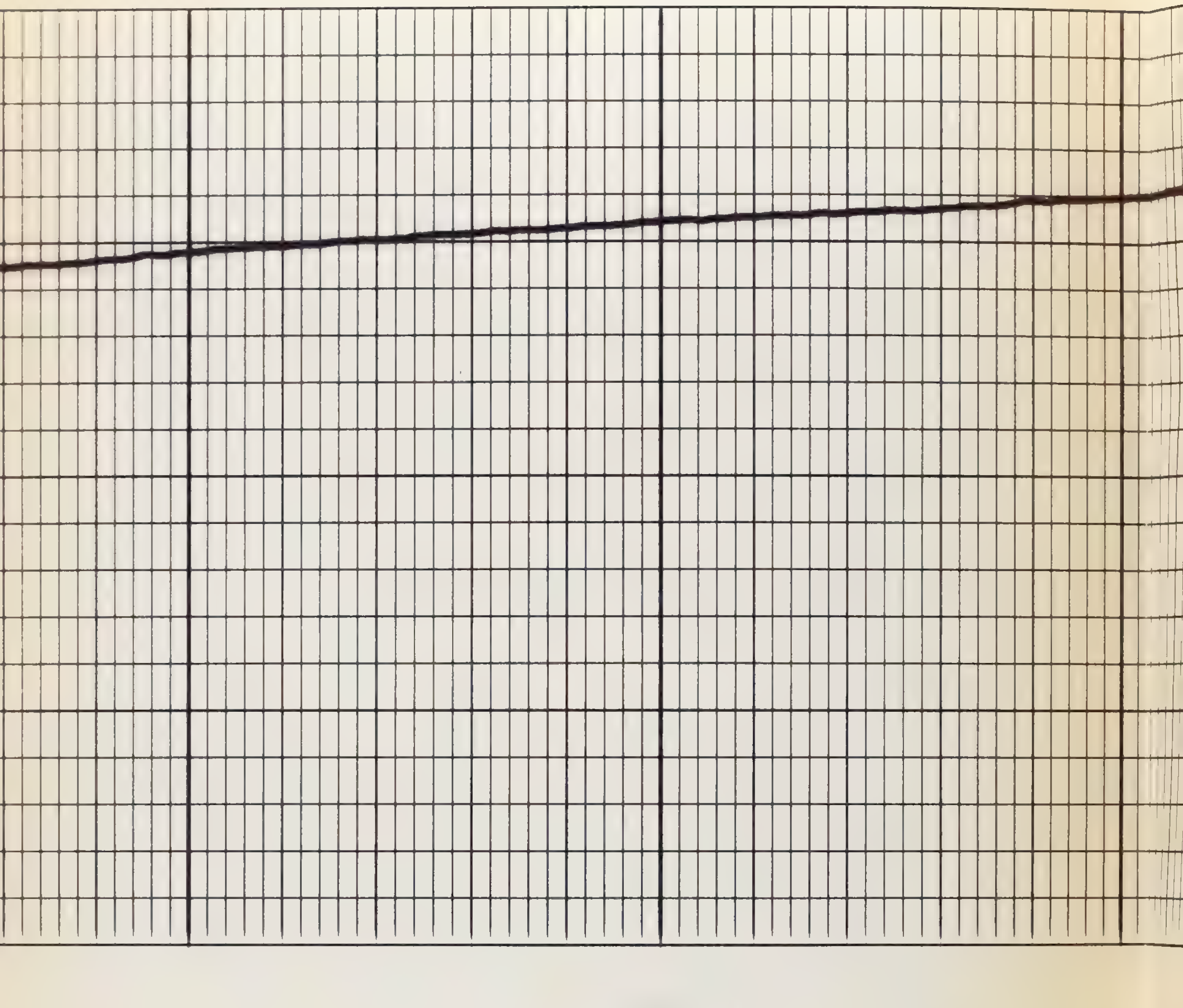
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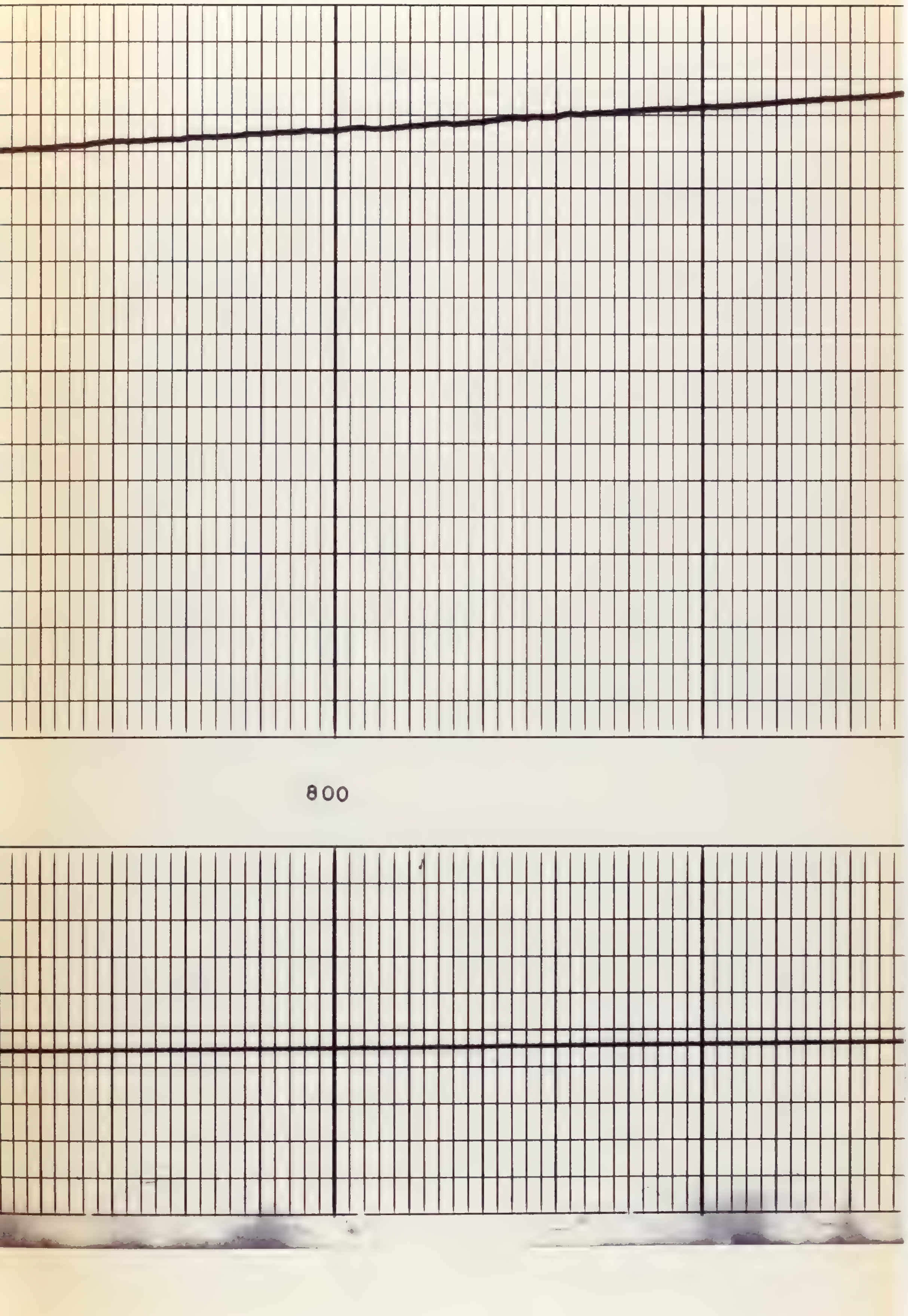
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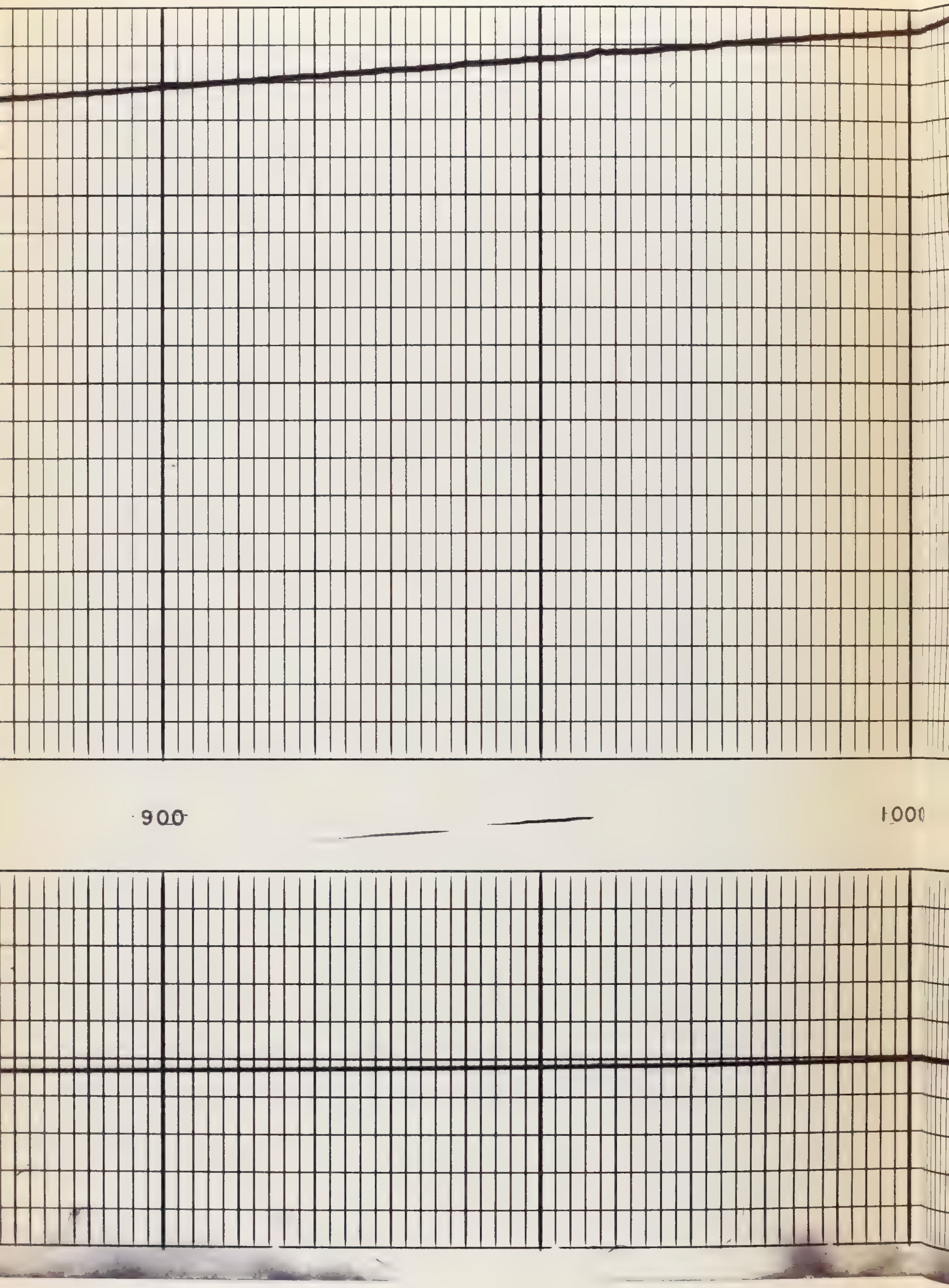
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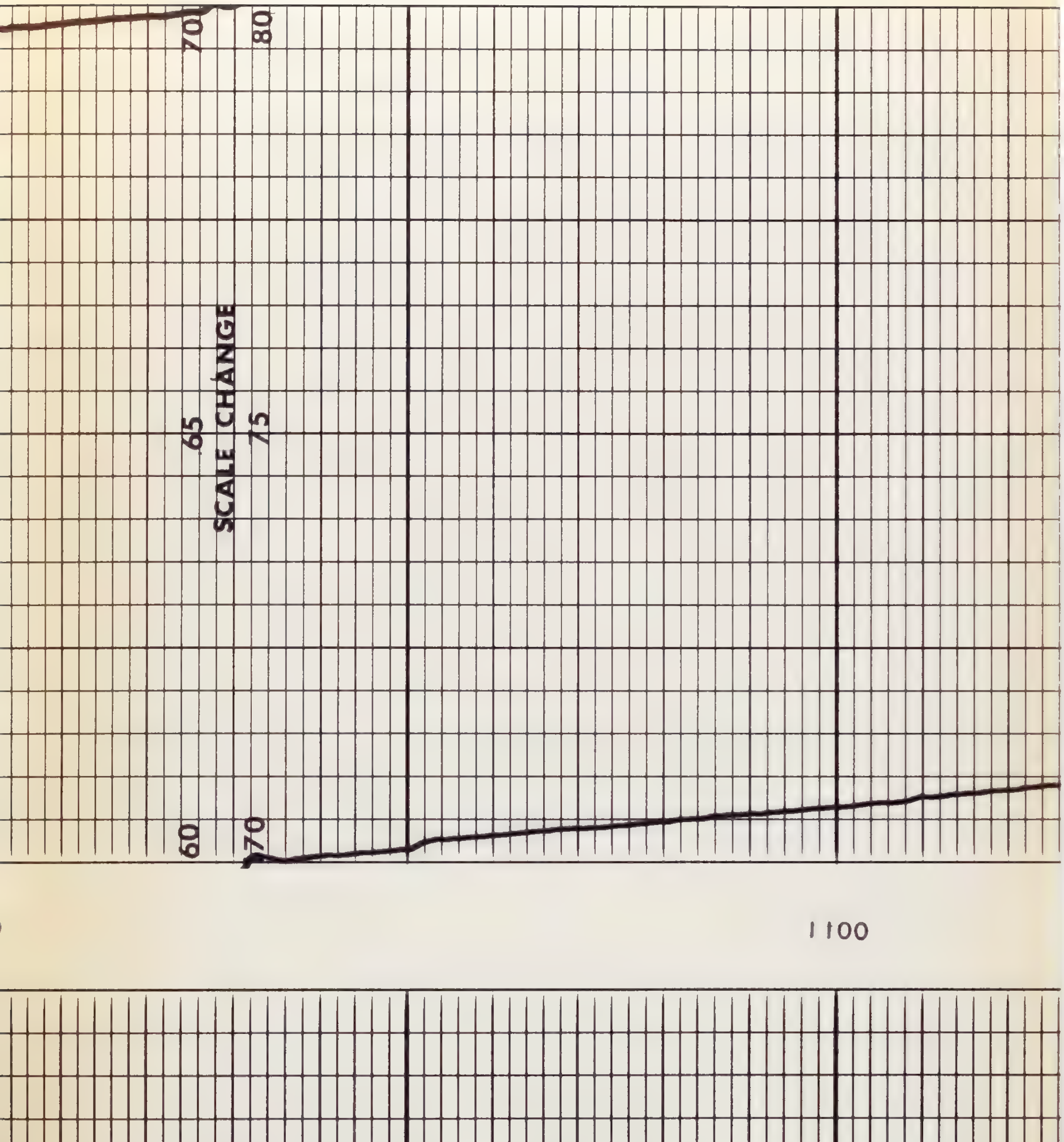
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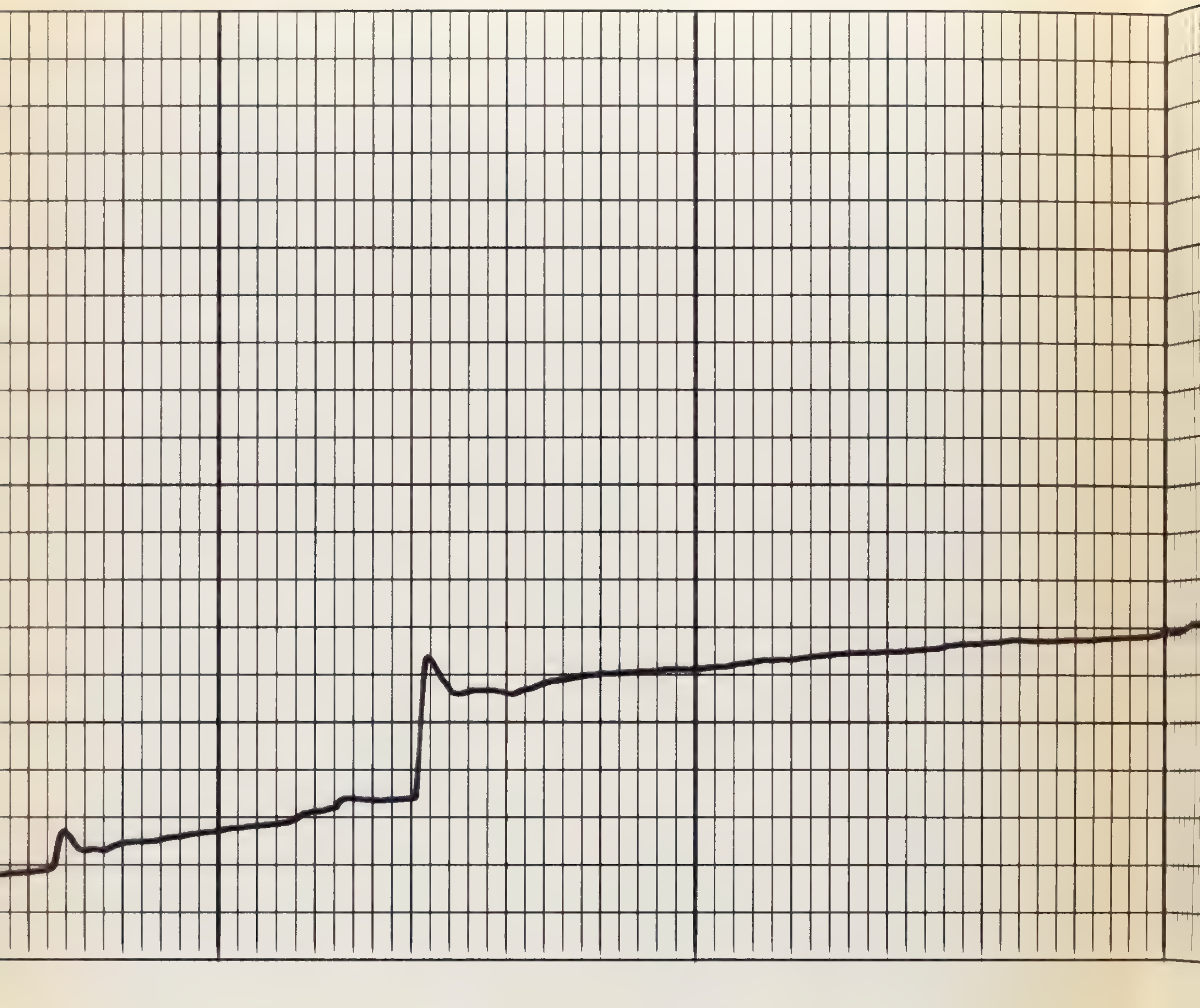
80
65
SCALE CHANGE
75
60
70
1100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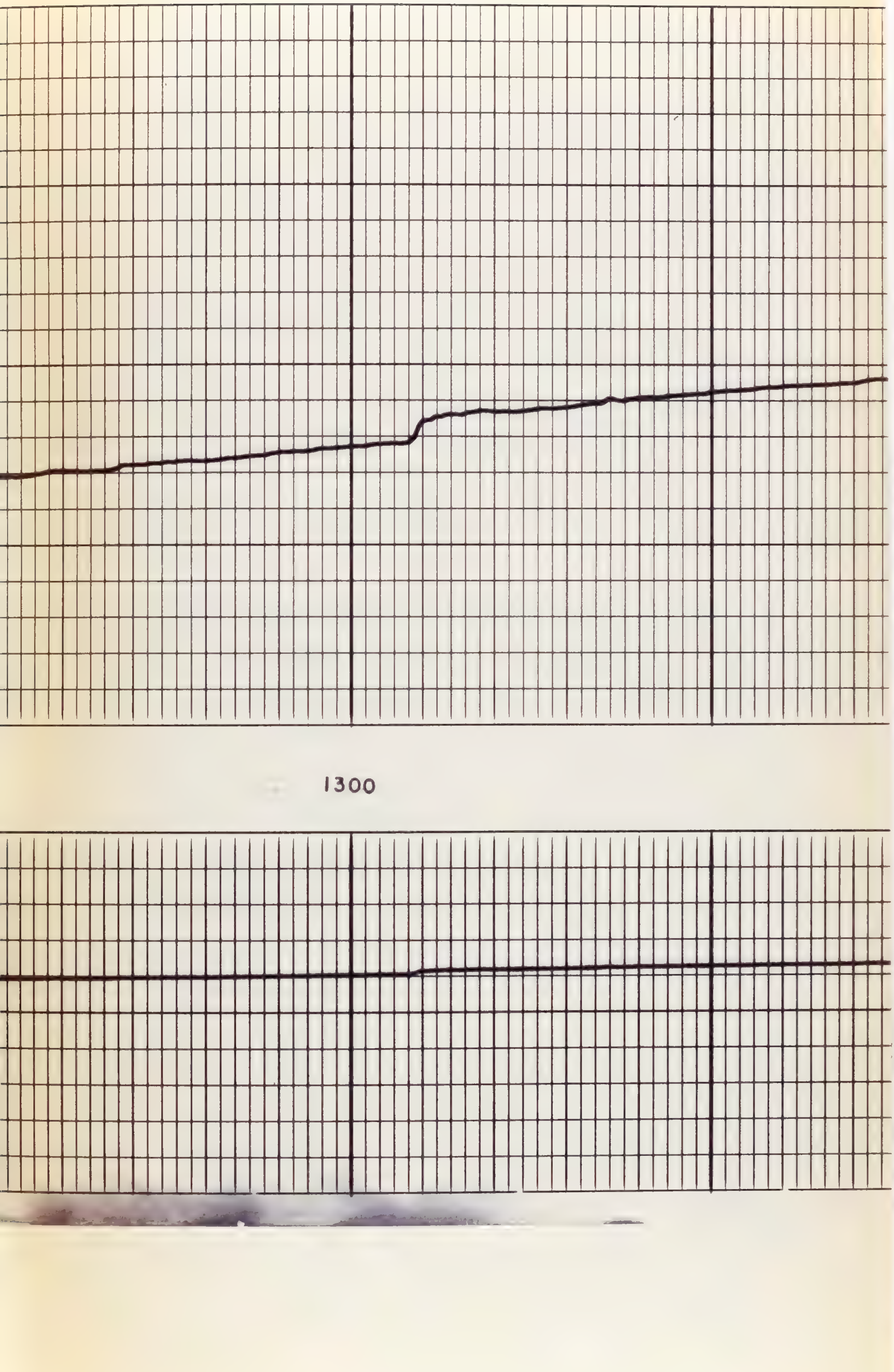
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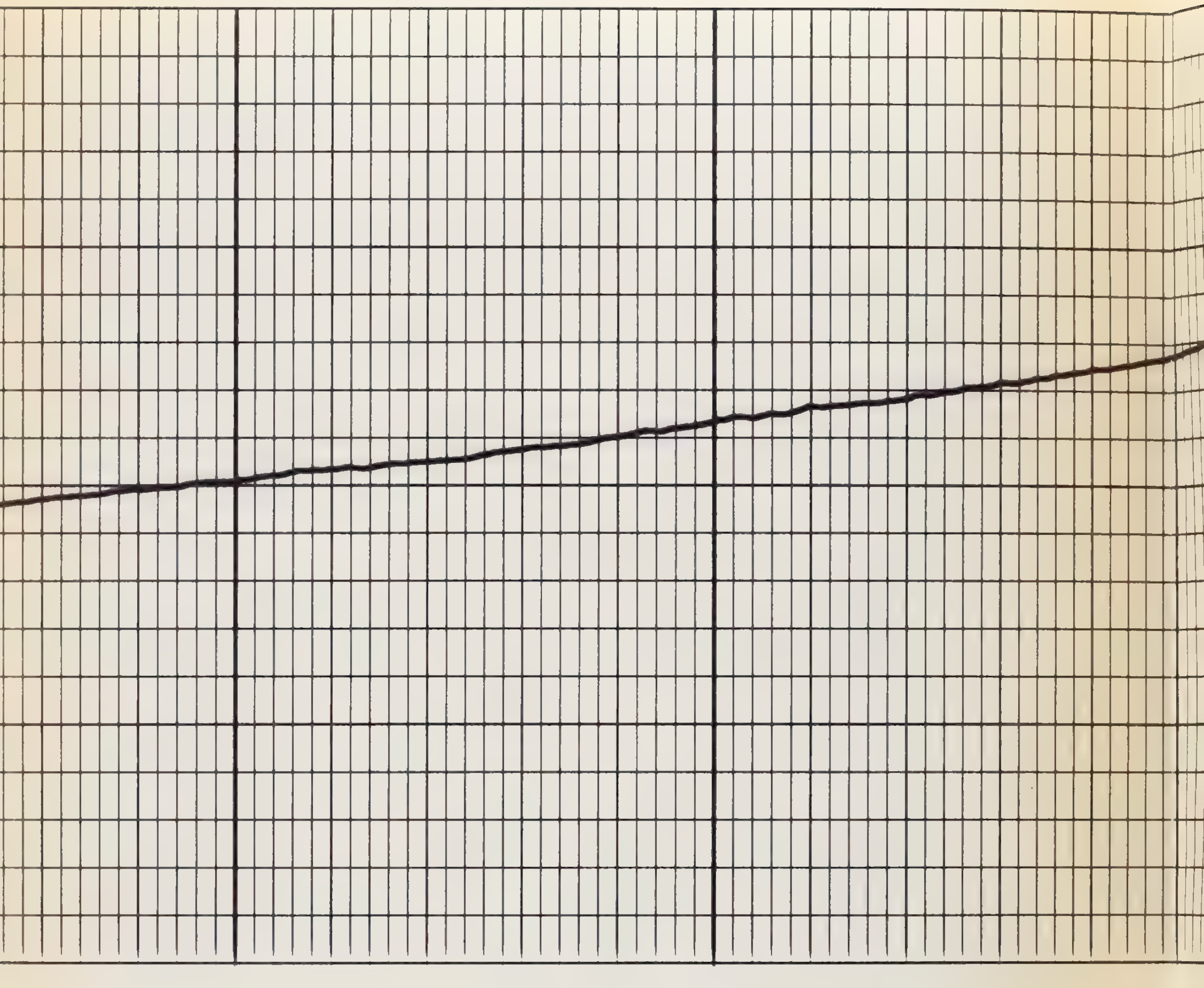
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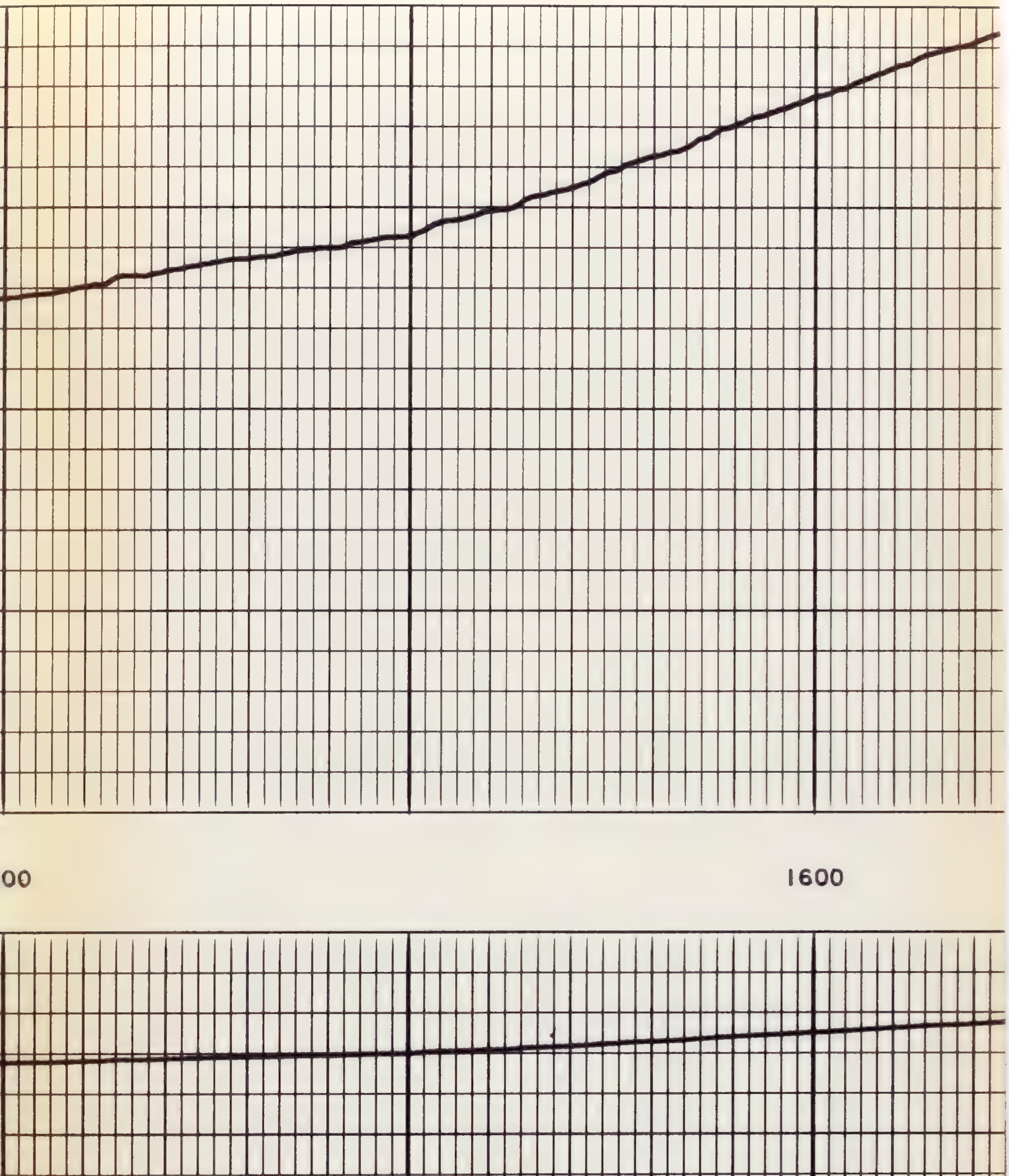
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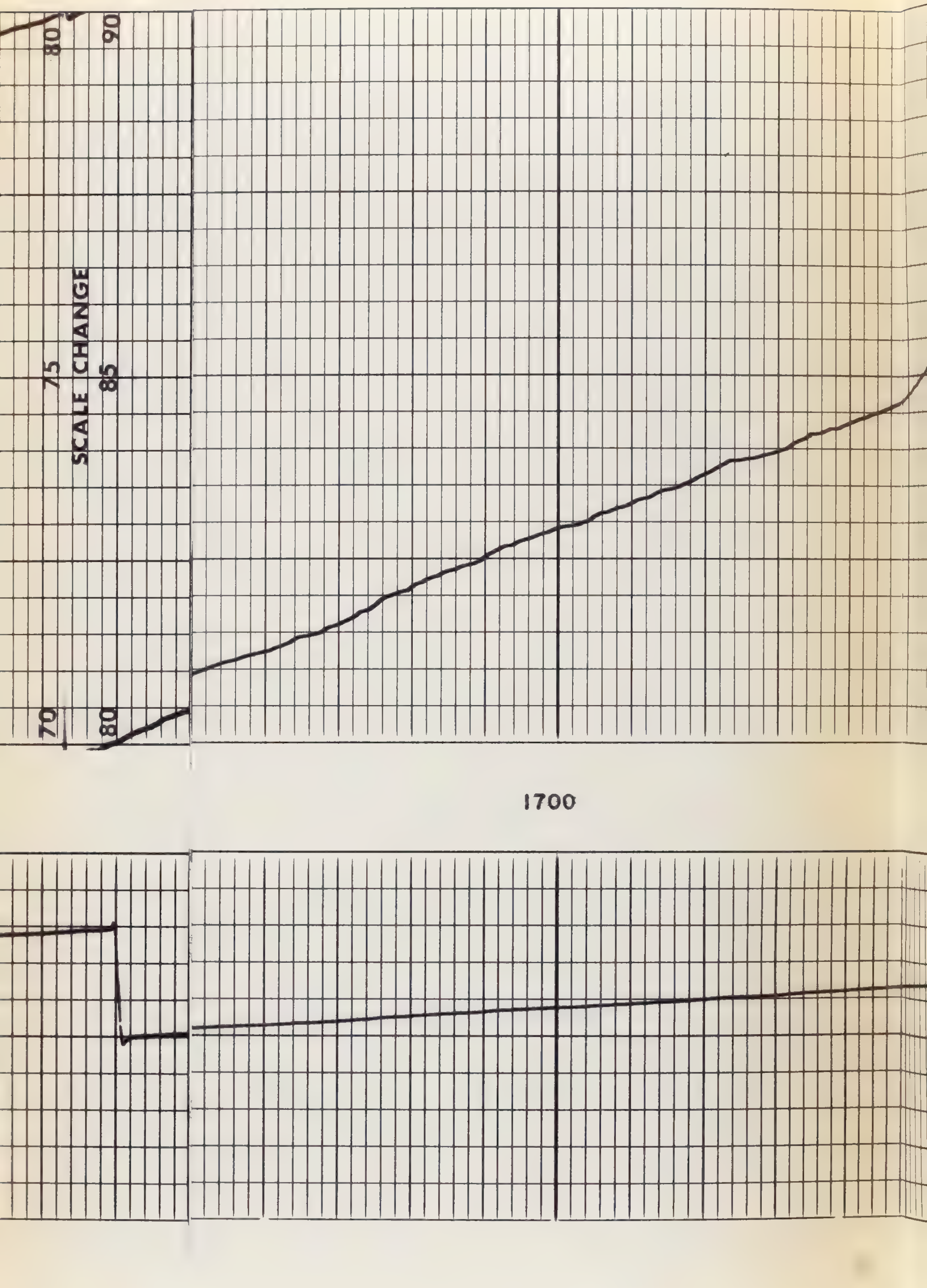
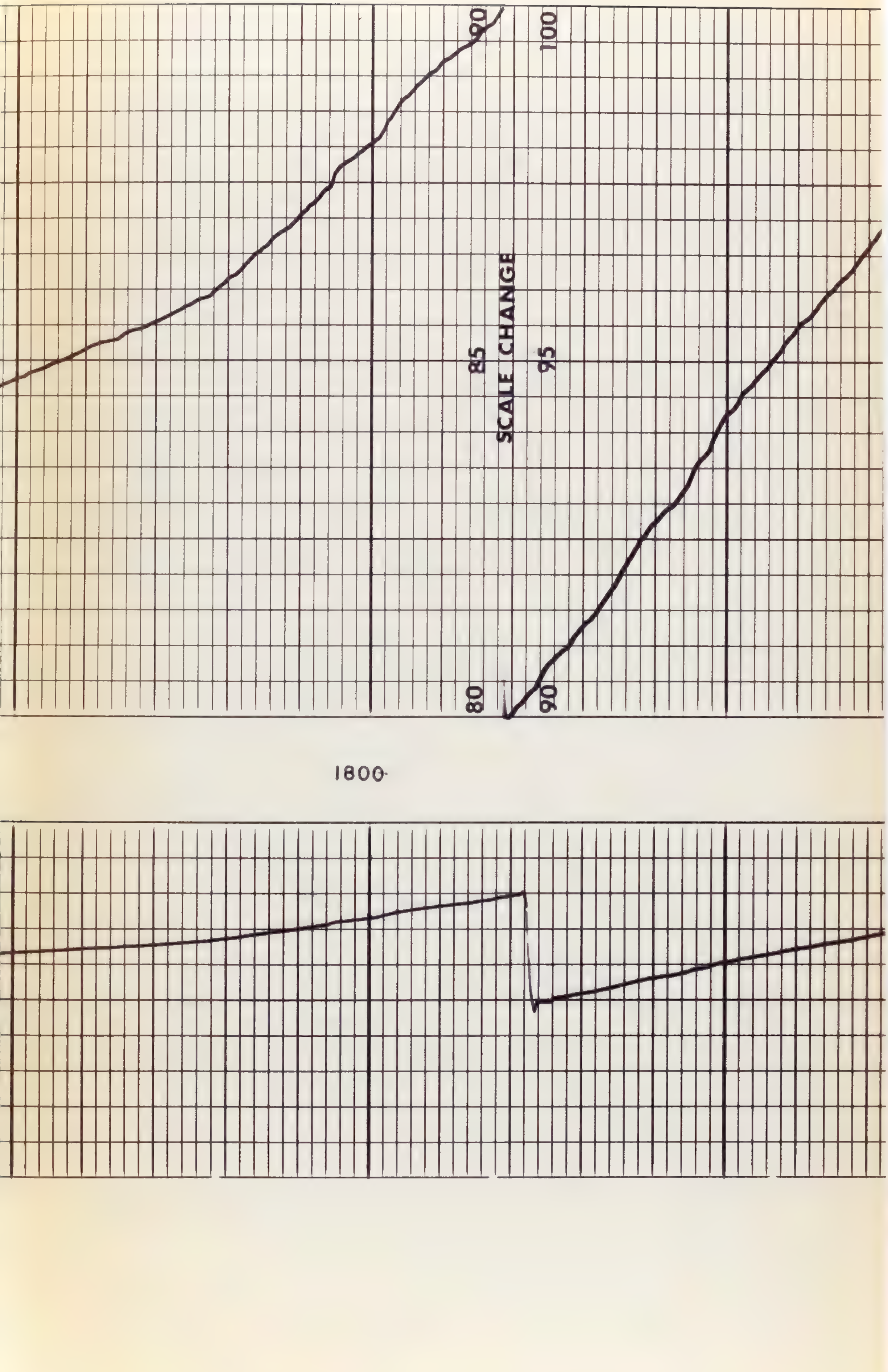
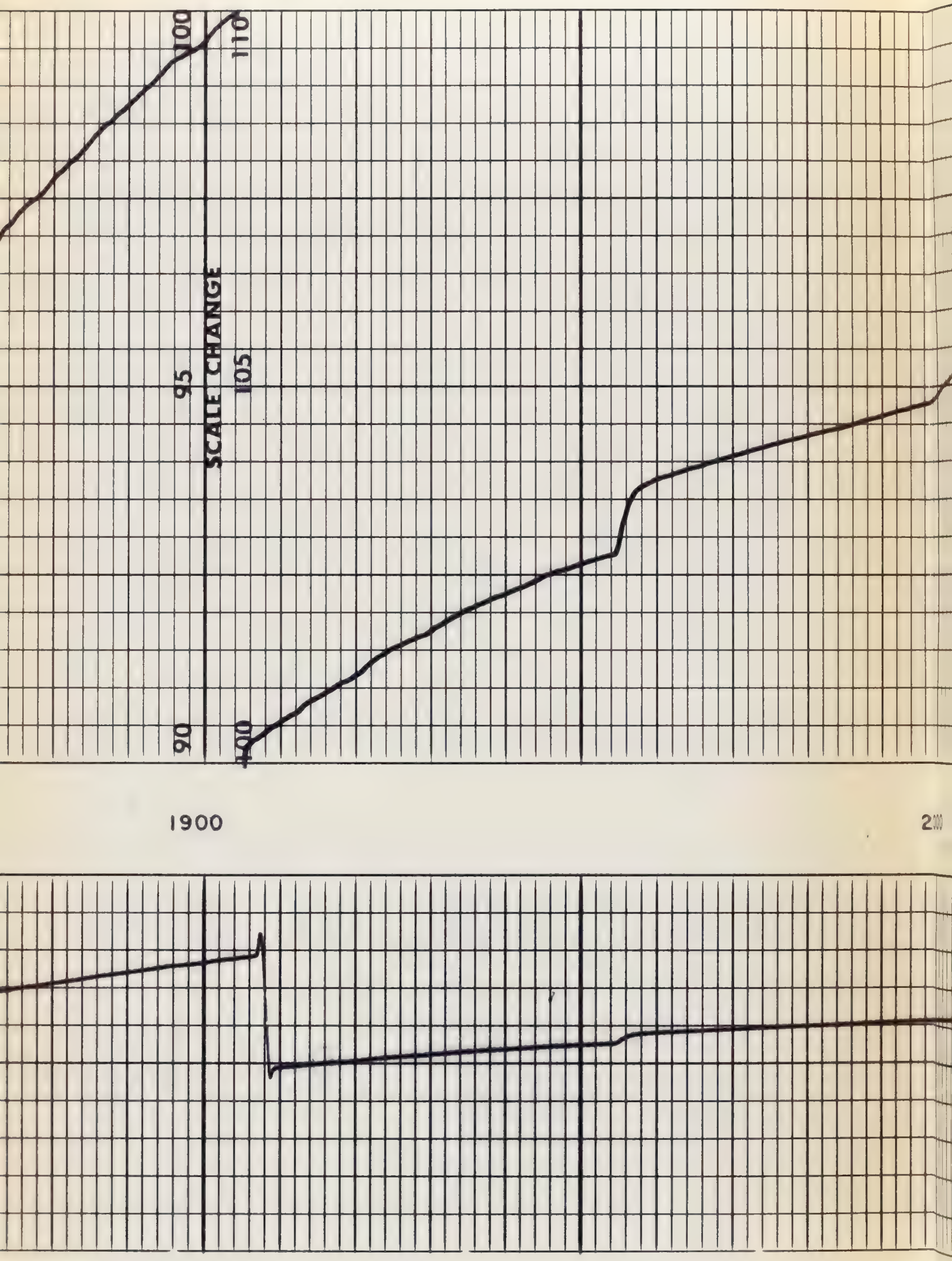
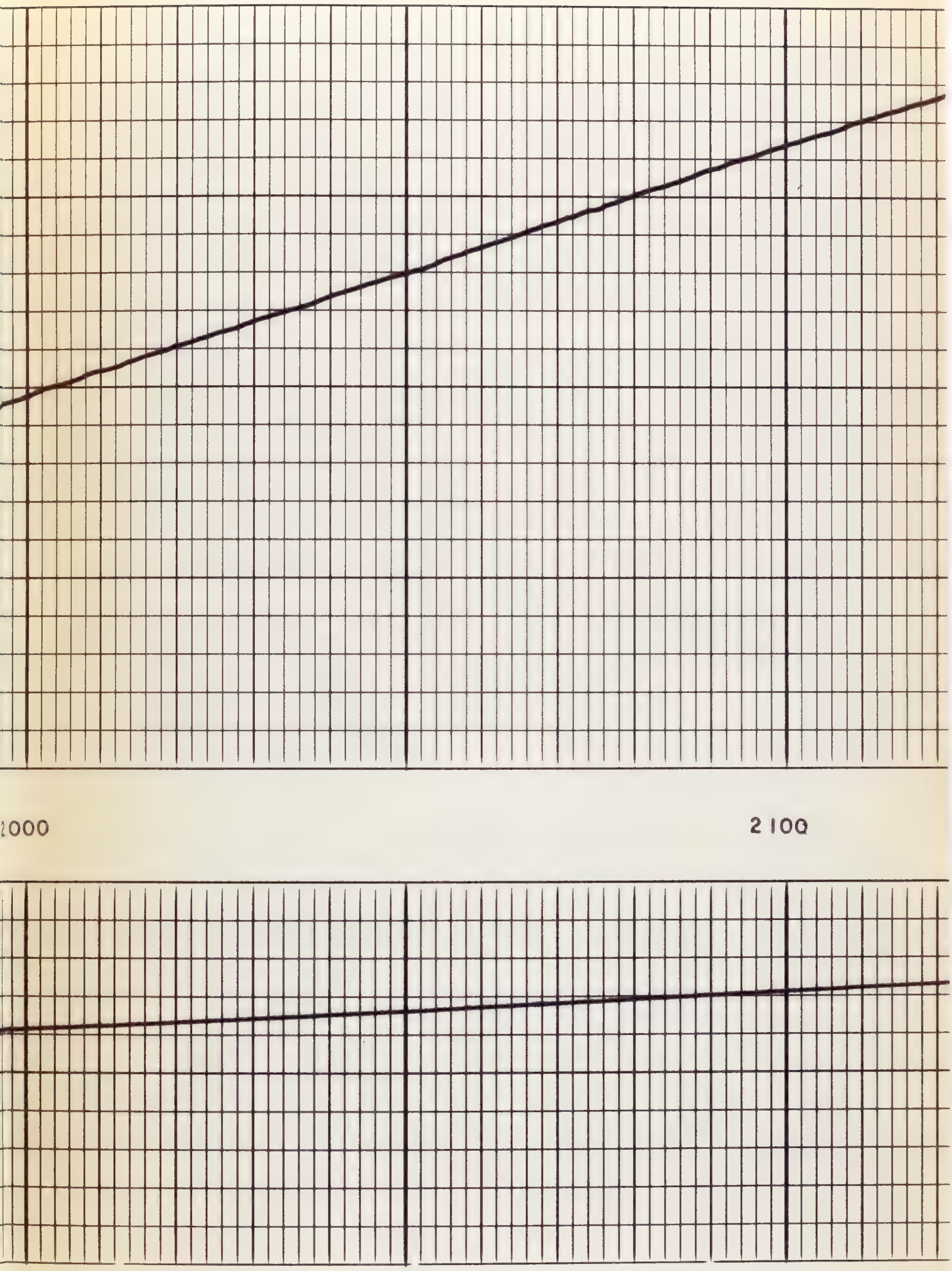
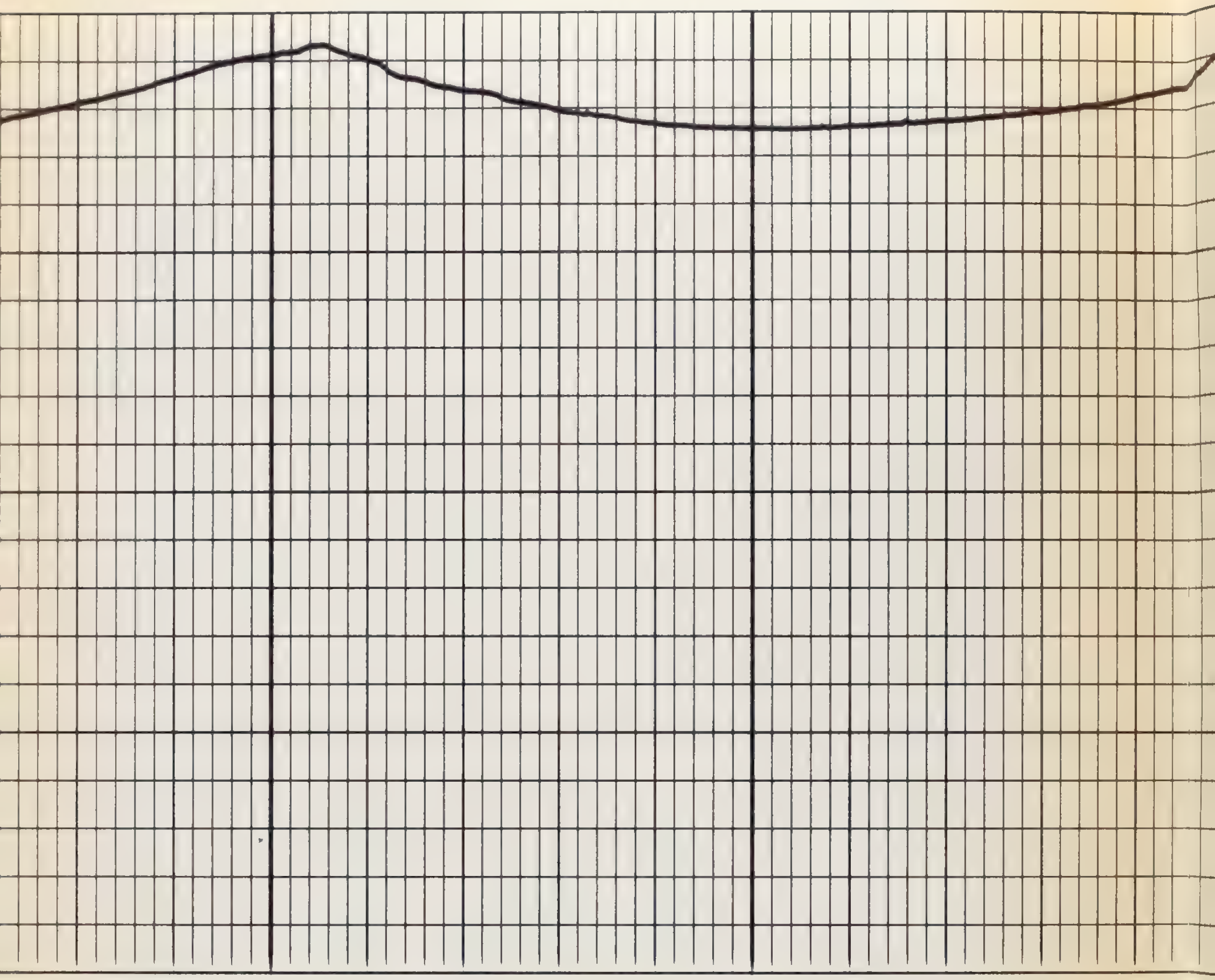

80
90
75
SCALE CHANGE
85
70
80
1700


90
100
85
SCALE CHANGE
95
80
90
1800


100
110
SCALE CHANGE
95
105
90
100
1900
2000


2000
2 100



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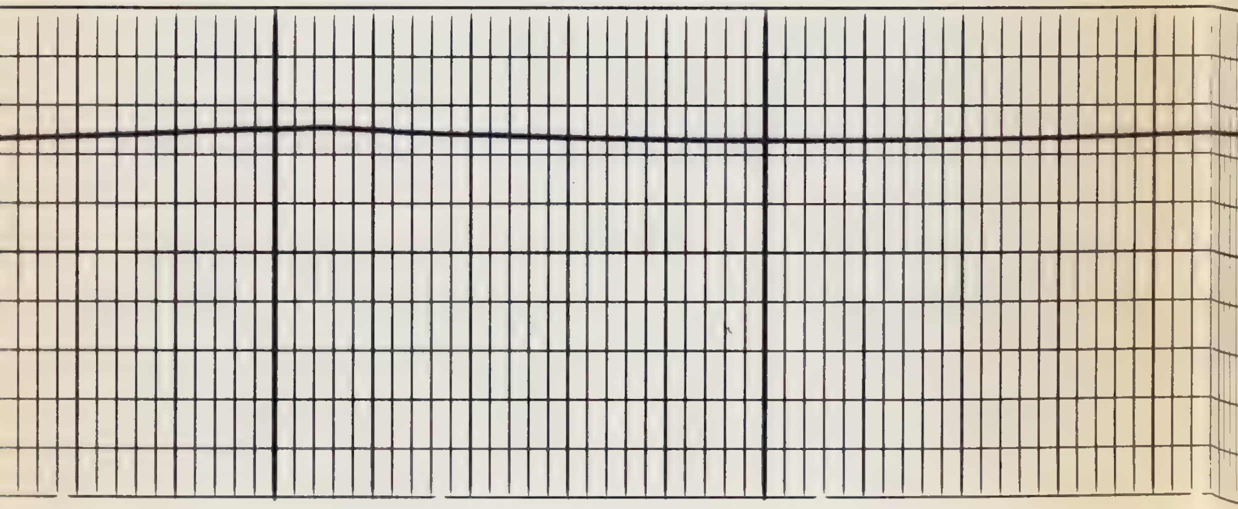
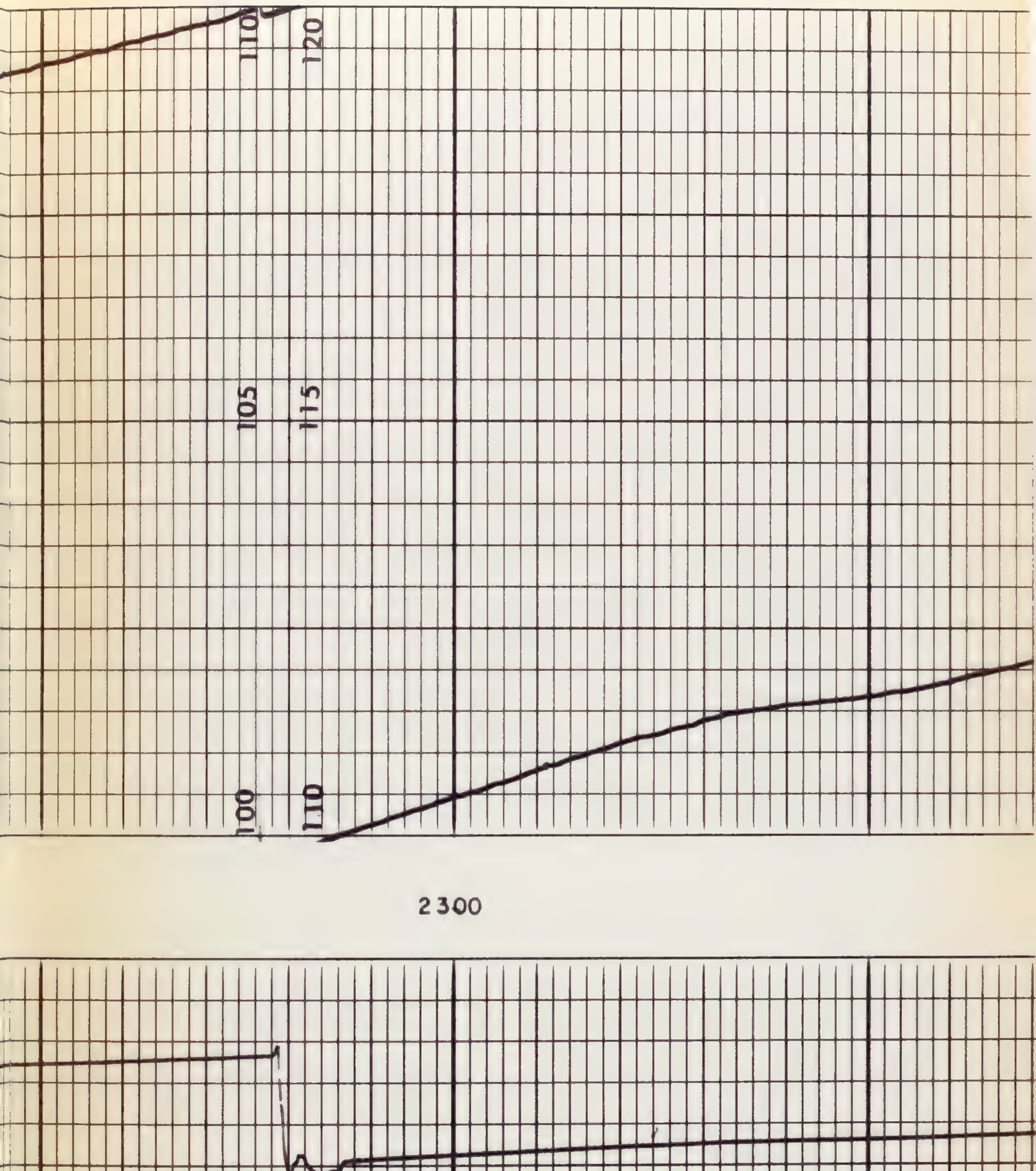
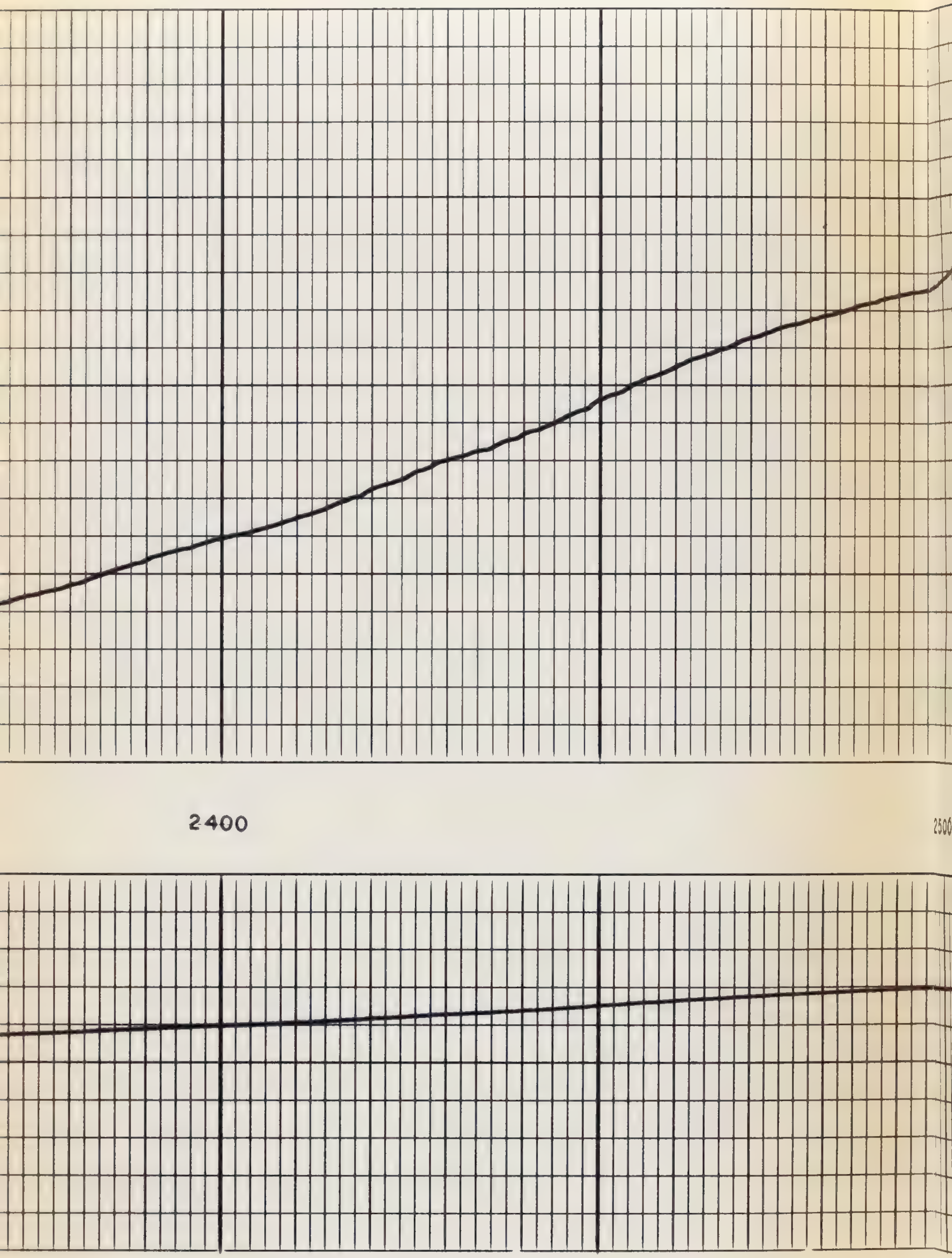



110
120
105
115
100
110
2300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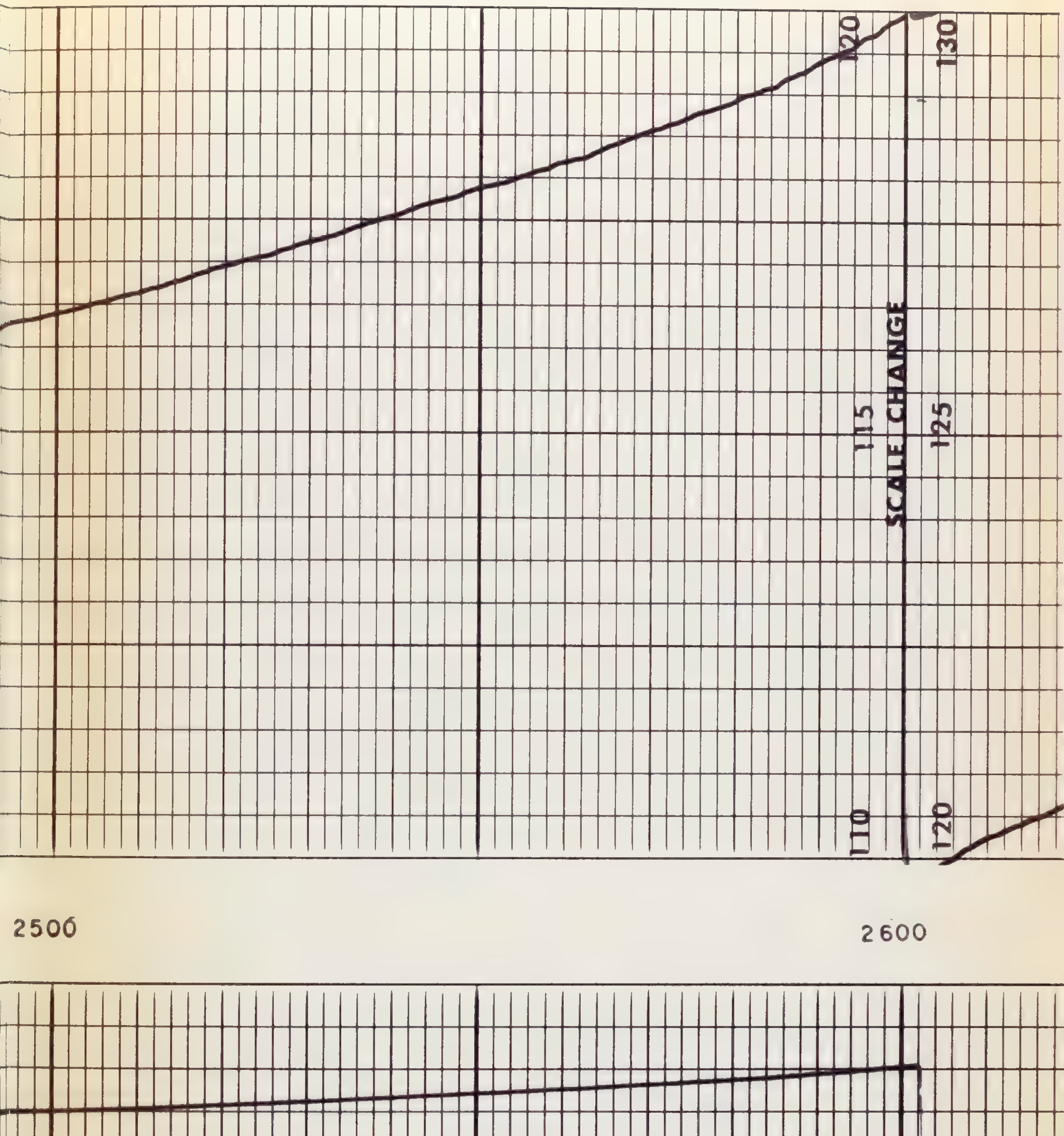
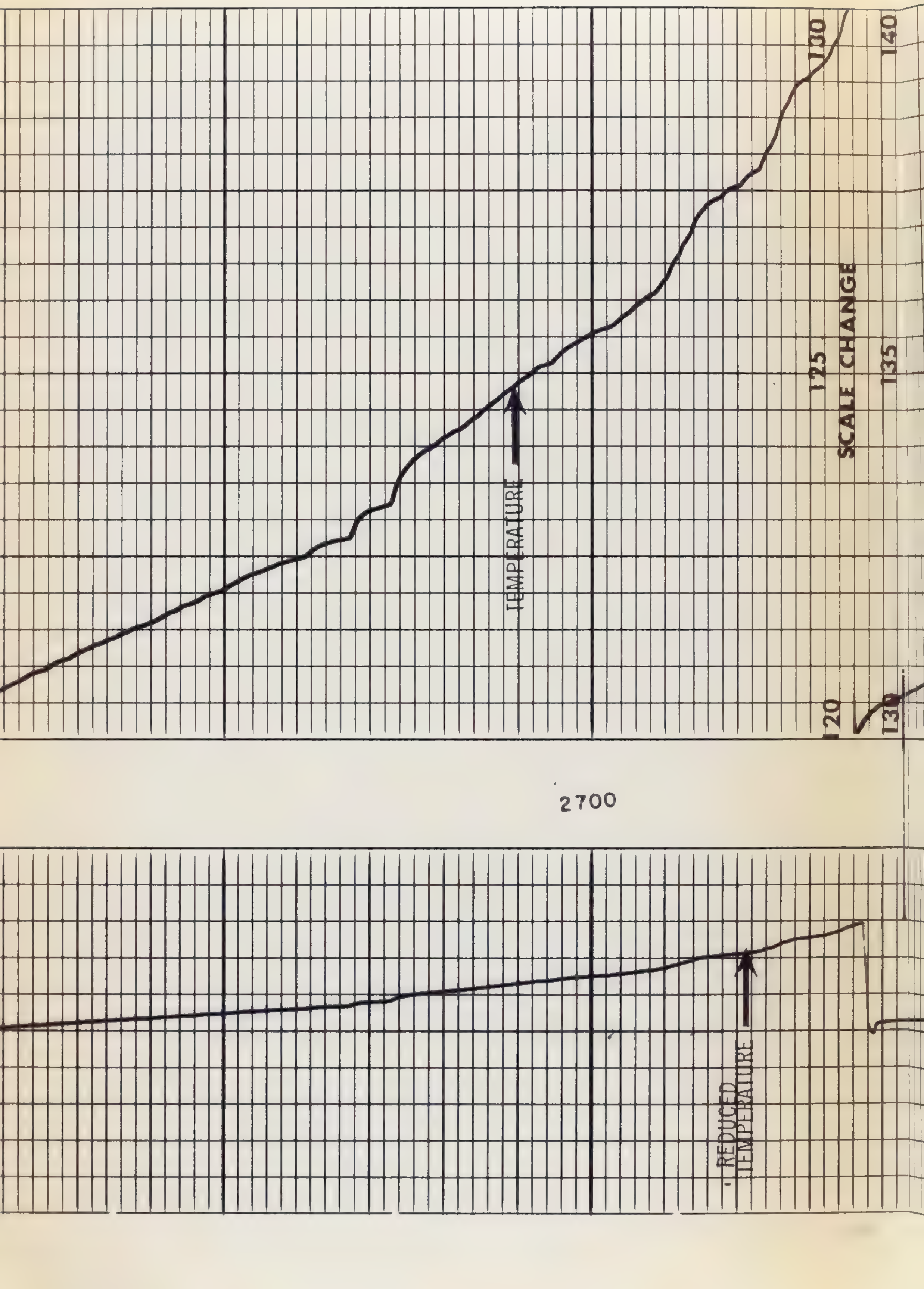
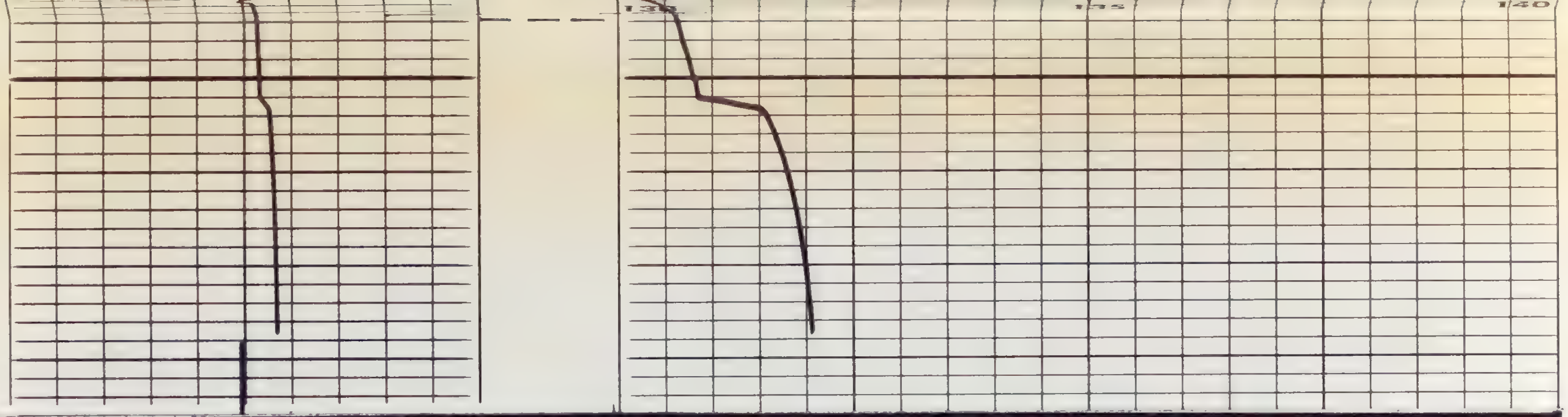

120
130
115
SCALE CHANGE
125
110
120
2500
2600


130
140
SCALE CHANGE
125
135
120
130
TEMPERATURE
2700
REDUCED TEMPERATURE



TEMPERATURE °F.

COMPANY ATLANTIC RICHFIELD COMPANY

WELL S. G. NO. 9

FIELD SORGHUM GULCH

COUNTY RIO BLANCO

STATE COLORADO

SCHL. F. R. 2743

SCHL. T. D. 2744

DRLR. T. D. 2750

COUNTY RIO BLANCO
FIELD or

Perma
Log M
Drillin

Date
Run N
Depth-
Depth-
Btm. Lo
Top Lo
Casing
Casing
Bit Size
Type F
Fluid L
Dens.
pH
Source
R_m
R_{mf}
R_{mc}
Sourc
R_m
Time Si
Max. R
Equip.
Record
W tnes

Schlumberger

COMPENSATED FORMATION DENSITY LOG

Gamma-Gamma

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GLUCH
WELL SORGHUM GULCH #17
COMPANY ARCO

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: 486' FWL & 181' FSL
API Serial No.

Sec. 16 Twp. 35 Rge. 96W

Other Services:
DLL
BHC-GR-AMP VD
HRT

Permanent Datum: GL ; Elev.: 7036
Log Measured From GL , Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 7044
D.F. 7943
G.L. 7036

Date	1/12/75			
Run No.	TWO			
Depth—Driller	2460			
Depth—Logger	2435			
Btm. Log Interval	2434			
Top Log Interval	0			
Casing—Driller	8 5/8 @ 56	@	@	@
Casing—Logger	60			
Bit Size	6 3/4			
Type Fluid in Hole	AIR MIST			
Fluid Level	402			
Dens. | Visc.	|	|	|	|
pH | Fluid Los	| ml	| ml	| ml	| ml
Source of Sample	AIR DRILLED			
R_m @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@ F
Source: R_{mf} | R_{mc}	|	|	|	|
R_m @ BHT	@ °F	@ F	@ F	@ F
Time Since Circ.	4W			
Max. Rec. Temp.	115 °F	°F	°F	F
Equip. | Location	5602 | GJ	|	|	|
Recorded By	ETTER-WAKLEY			
Witnessed By	BURNS			

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.				
Depth - Driller					
Type Fluid					
Source of Sample					
R_m @ Meas. Temp.		@	°F	@	°F
R_{mf} @ Meas. Temp.		@	°F	@	°F
R_{mc} @ Meas. Temp.		@	°F	@	°F
R_m @ BHT		@	°F	@	°F
Dens.	Visc.				
ph	Fluid Loss		ml		ml
% Water by Vol.					
% Oil by Vol.					
% Solids by Vol.					
Solids Av. Sp. Gr.					

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

LOGGING DATA

FDC Selectors					
Liquid Density	Grain Density	Hole Fluid	Porosity Scale	From	To
1.00	2,71	LIQUID			

EQUIPMENT DATA

Run No.	TWO			
Panel No.	169			
Cart No.	289			
Skid No.	688			
Sonde No.	90			
Source	3098			
Calibrator	210			
GR Cart.	311			
TTR				
Mem Panel	235			

REMARKS

Service Order No. - 22470

APPARCNT 2 BIG DIVISON SHIFT OF GRAMMA RAY. DID NOT SHIFT GR PHYSICALLY TO MATCH DESIRED SCALE AS I DO NOT KNOW YET WHAT CAUSED THE INITIAL SHIFT. NOT CHARGED GAMMA RAY REPEATS POORLY, SEE BHC LOG FOR SCALED GR.

BIT SIZE, CASING DATA

Bit	From	To	Csg. Size	Csg. Wt.	From	To
6- 3/4	56	2460	8 5/8		SURF	56

CALIBRATION DATA

Run | Gamma Ray | FDC – Before Log | ACPS | FDC | After Log | ACPS

CALIBRATION DATA

Run No.	Gamma Ray			FDC — Before Log — ACPS		FDC — After Log — ACPS	
	API Scale	Background CPS	Total CPS	P_1	P_2	P_1	P_2
1	0-150	100	490	528	860	528	860
2							
3							
4							

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

CALIPER

HOLE DIAM. IN INCHES

5 15

GAMMA RAY

API UNITS

CORRELATION GAMMA

RAY; SEE REMARKS

DEPTHS

—.25 0 .25

CORRECTION

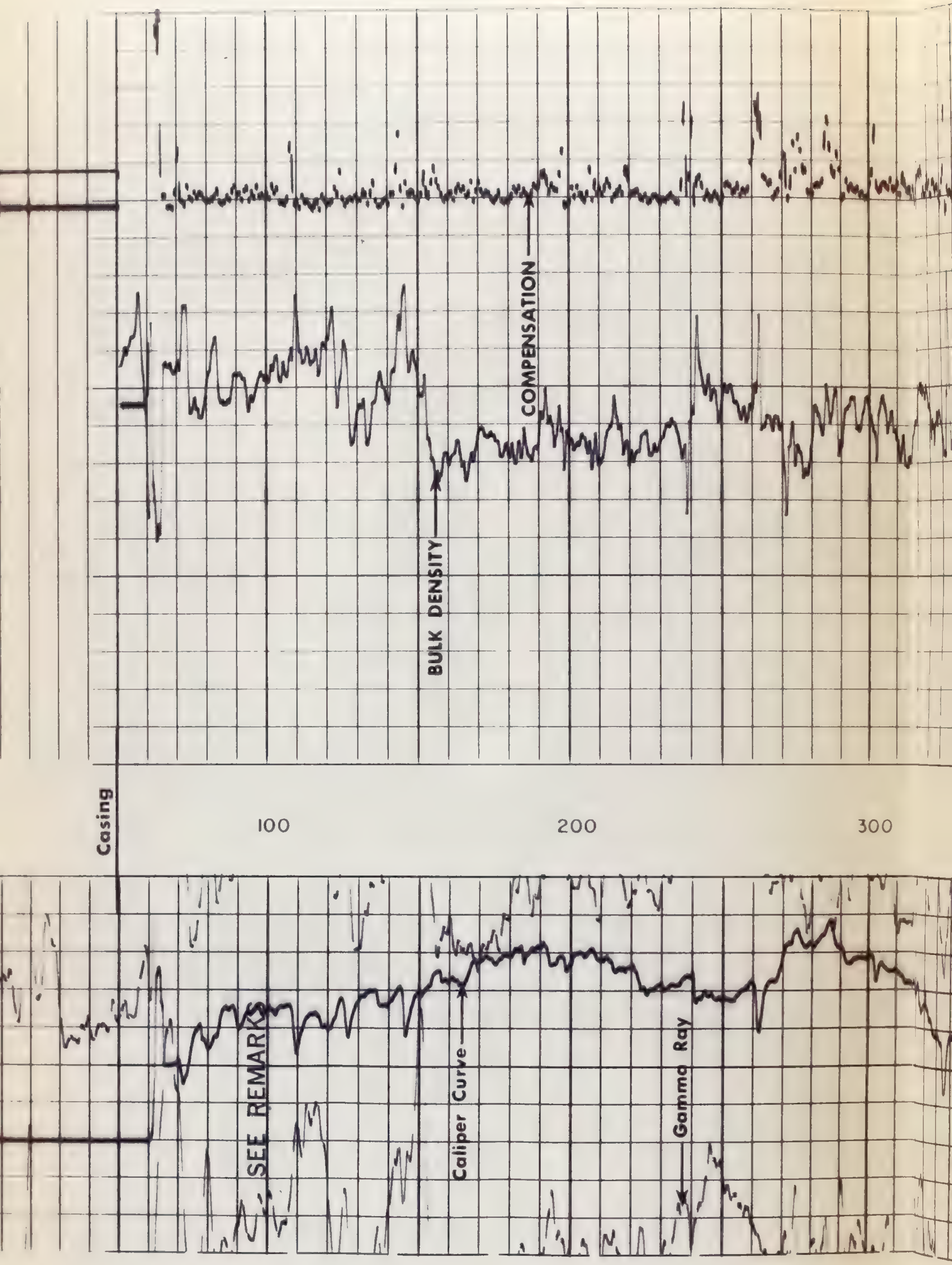
GRAMS/CC.

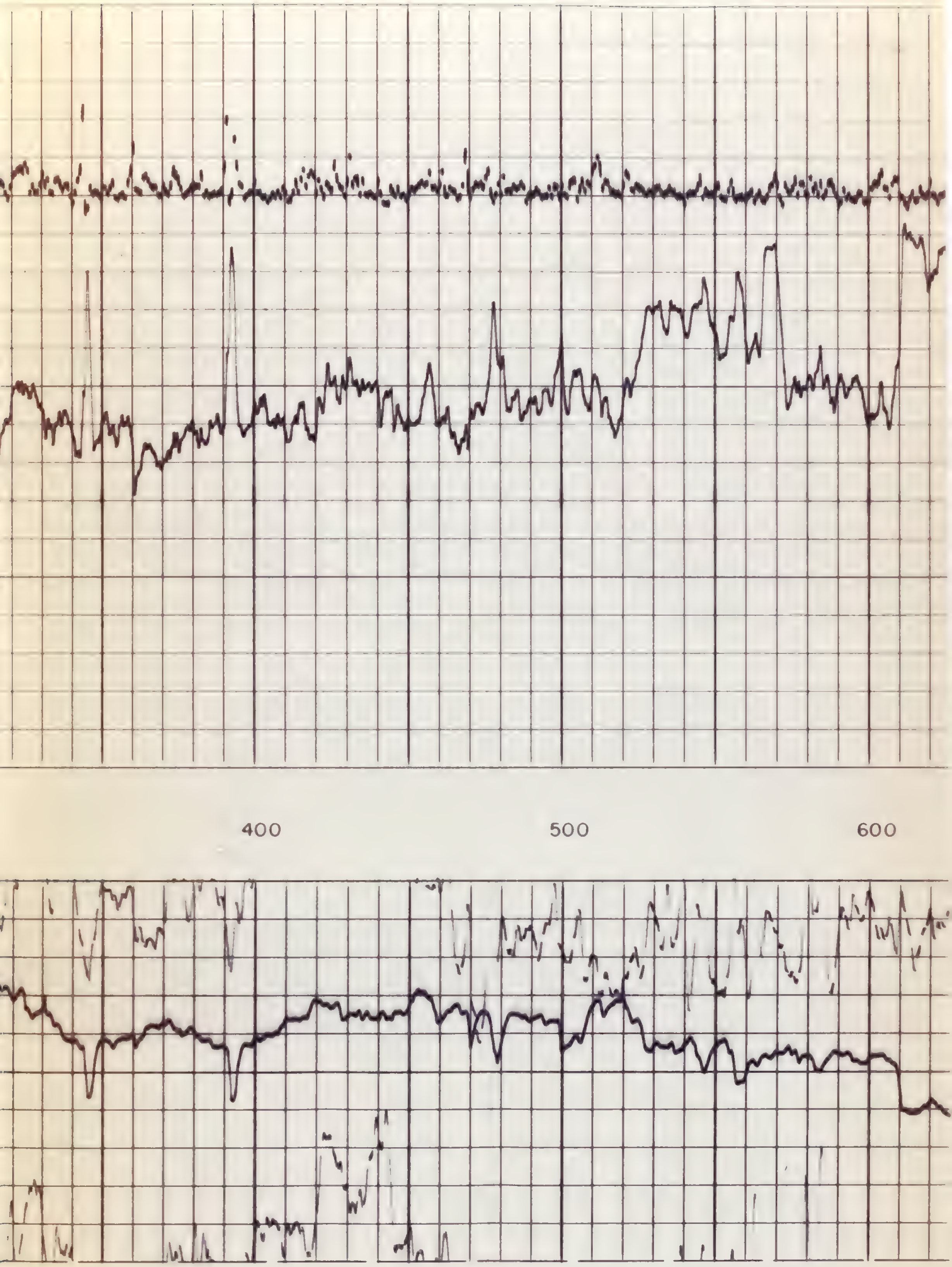
BULK DENSITY

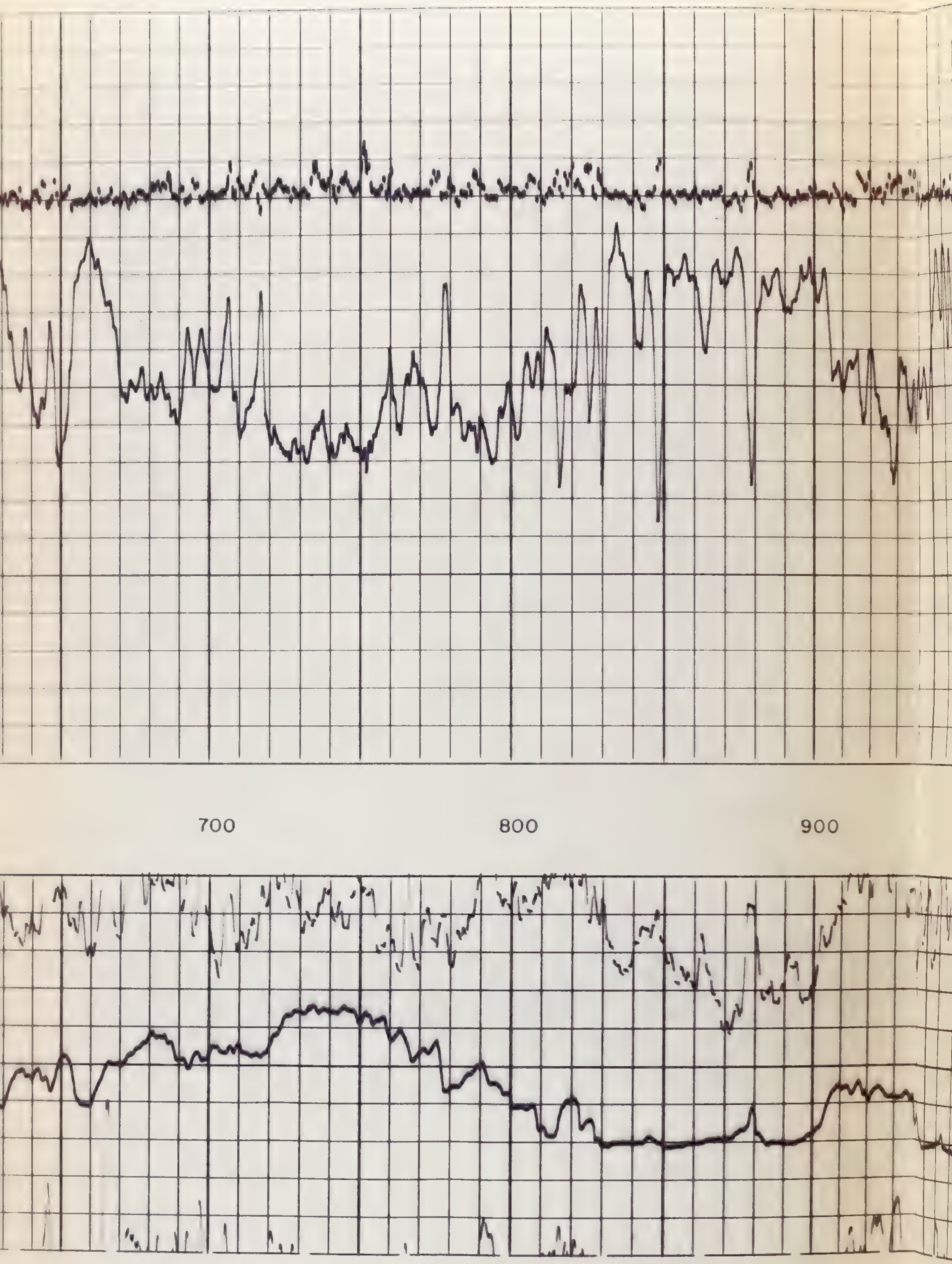
GRAMS CC.

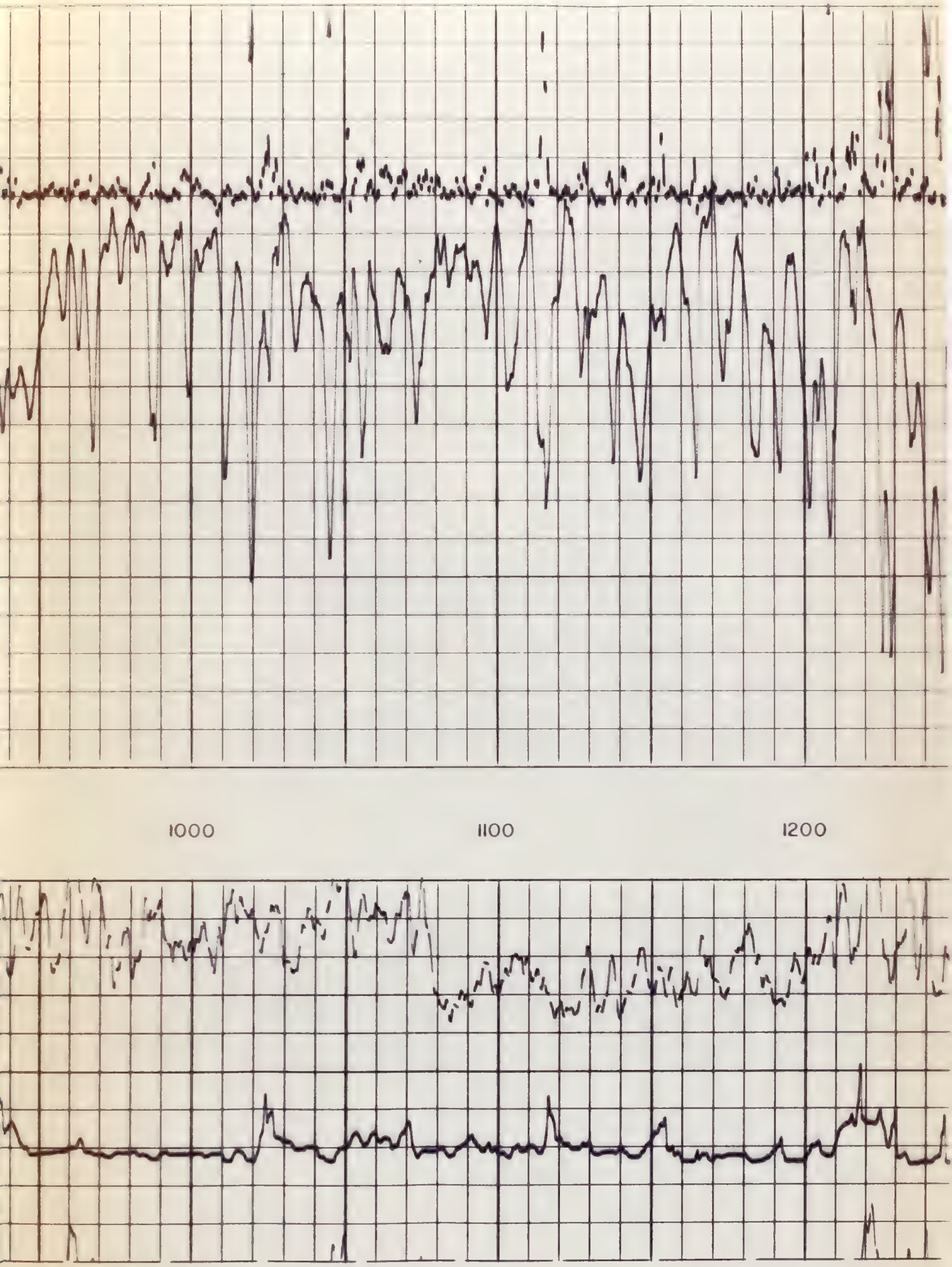
1.7 22 2.7

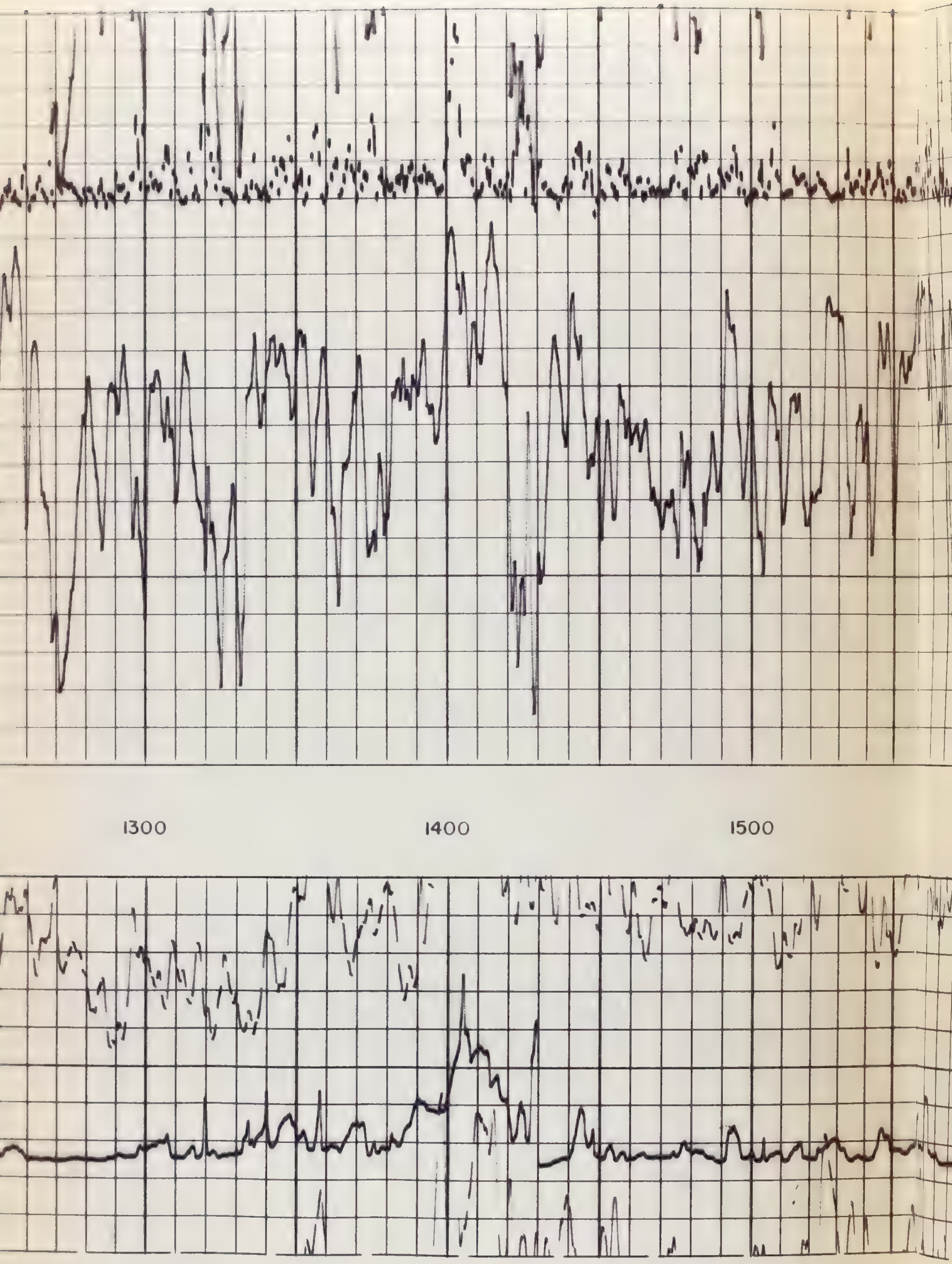
.7 1.2 1.7

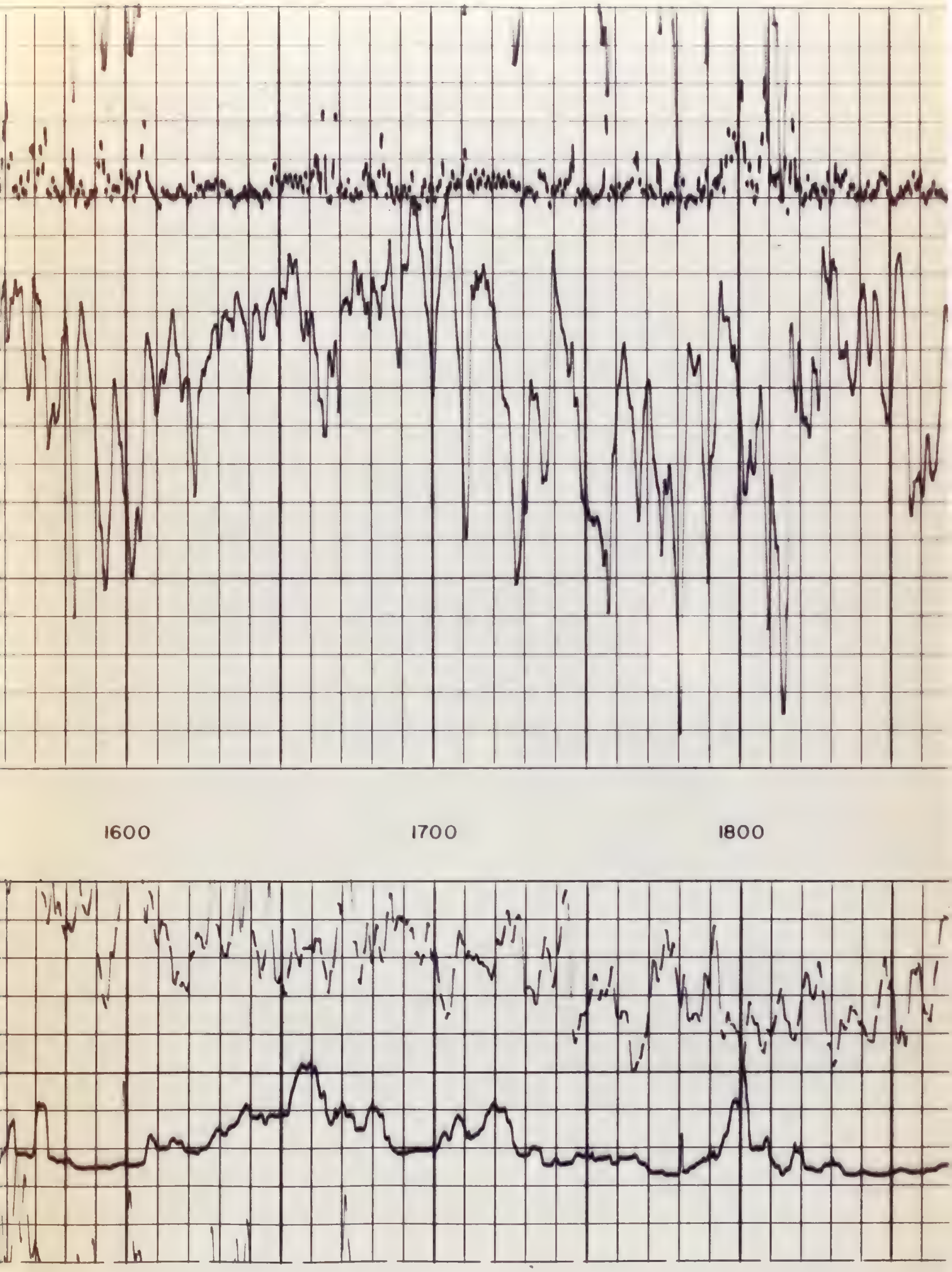

COMPENSATION
BULK DENSITY
Casing
100
200
300
SEE REMARKS
Caliper Curve
Gamma Ray

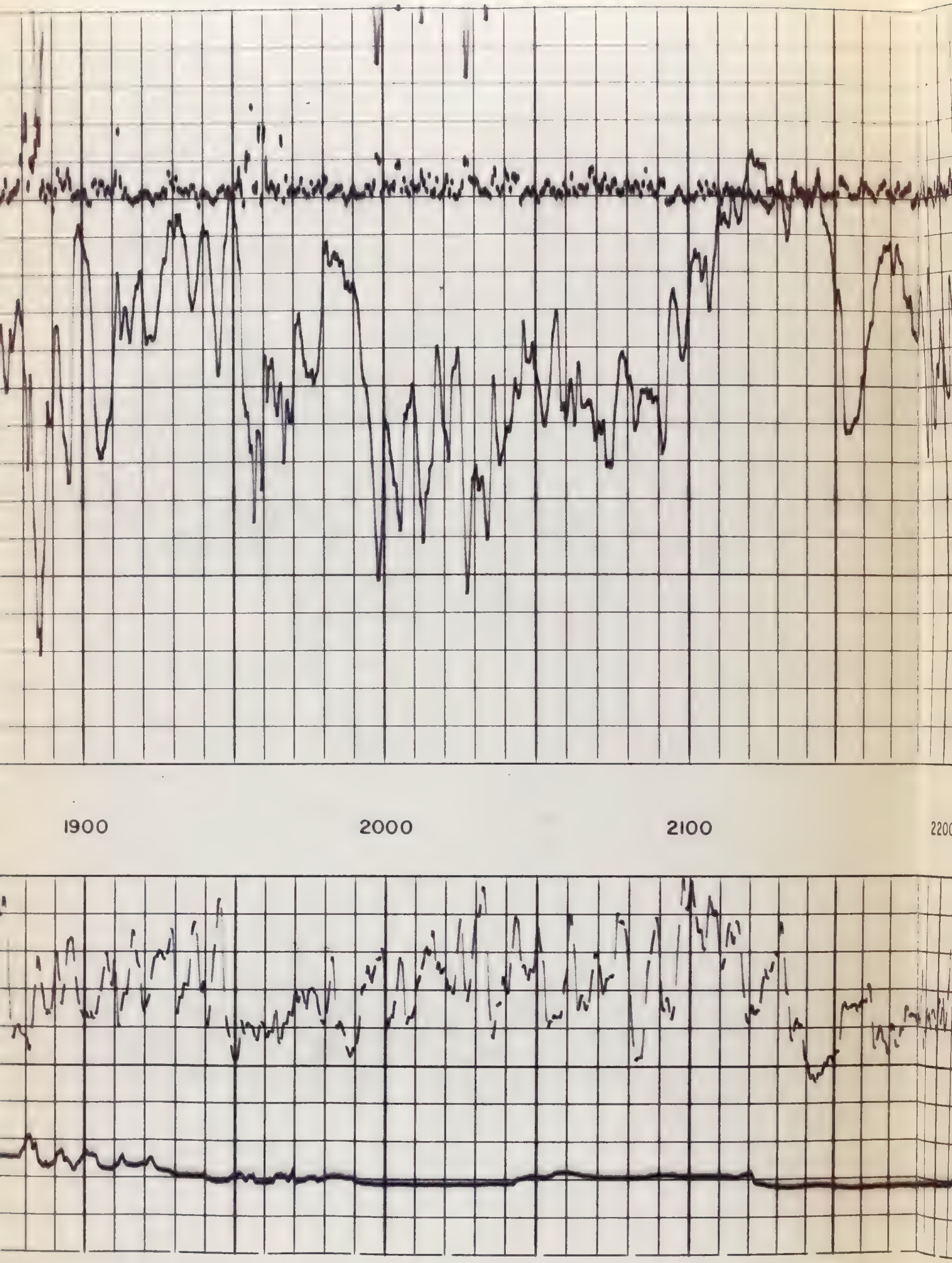

400
500
600

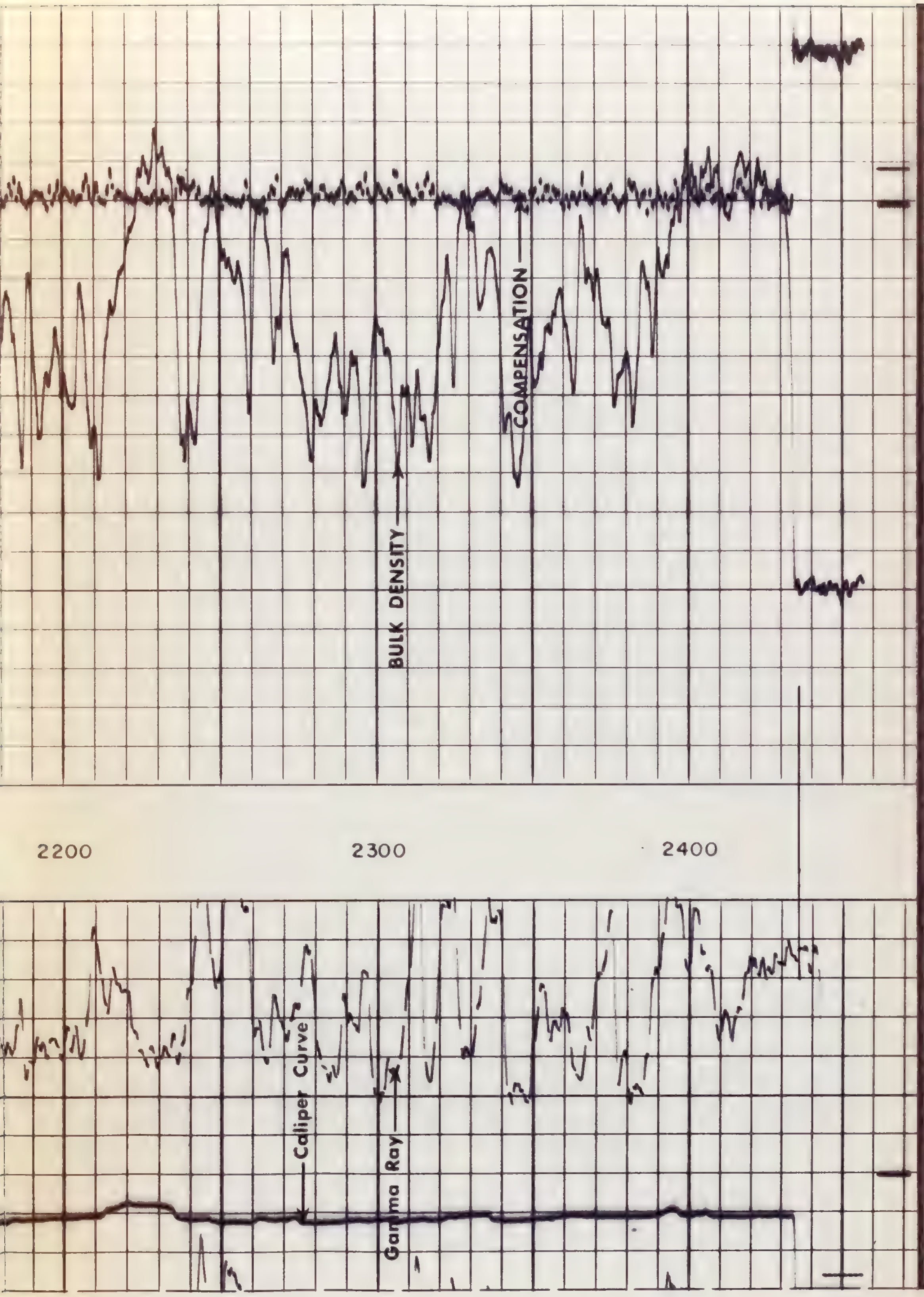

700
800
900


1000
1100
1200

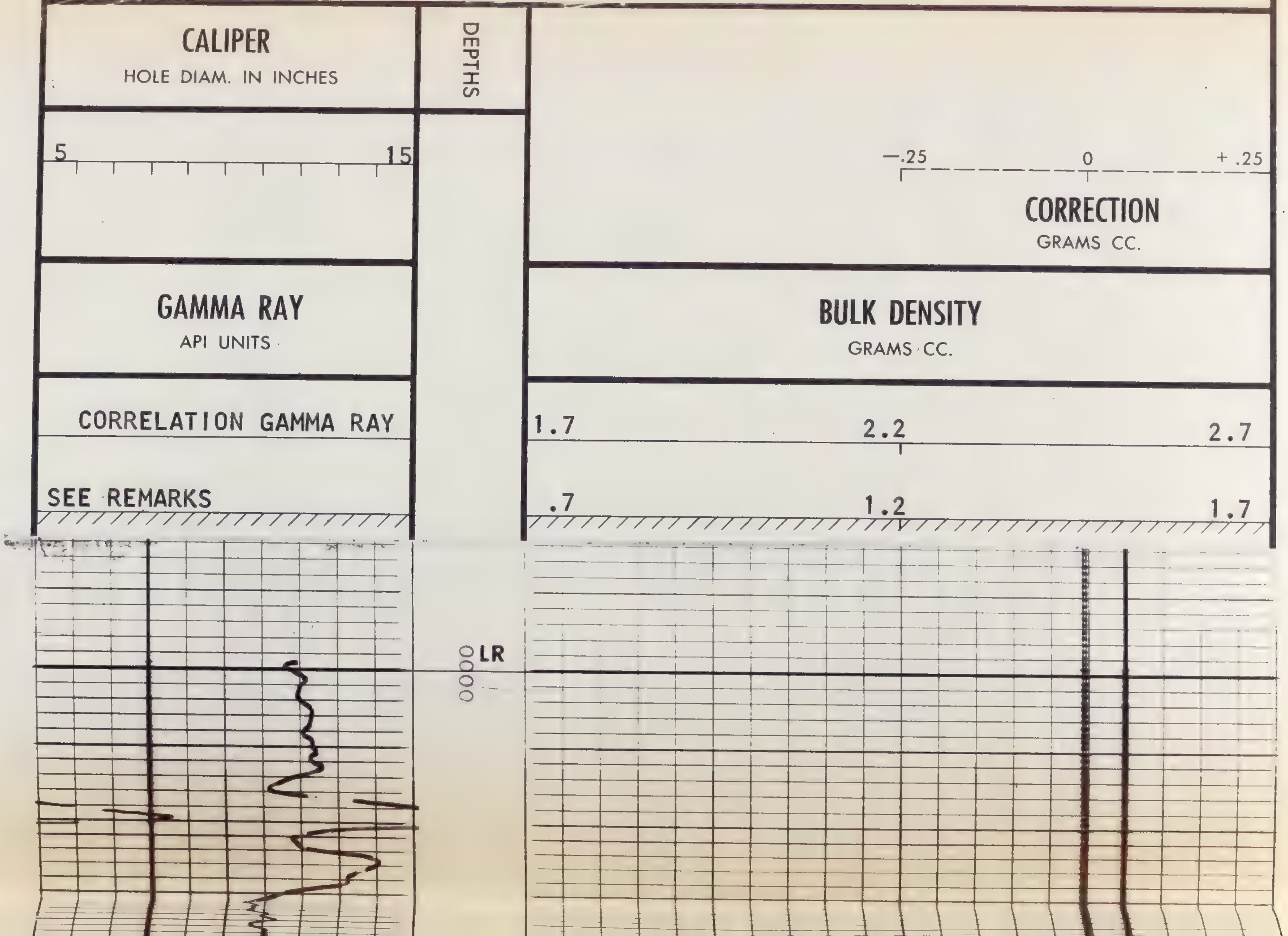

1300
1400
1500

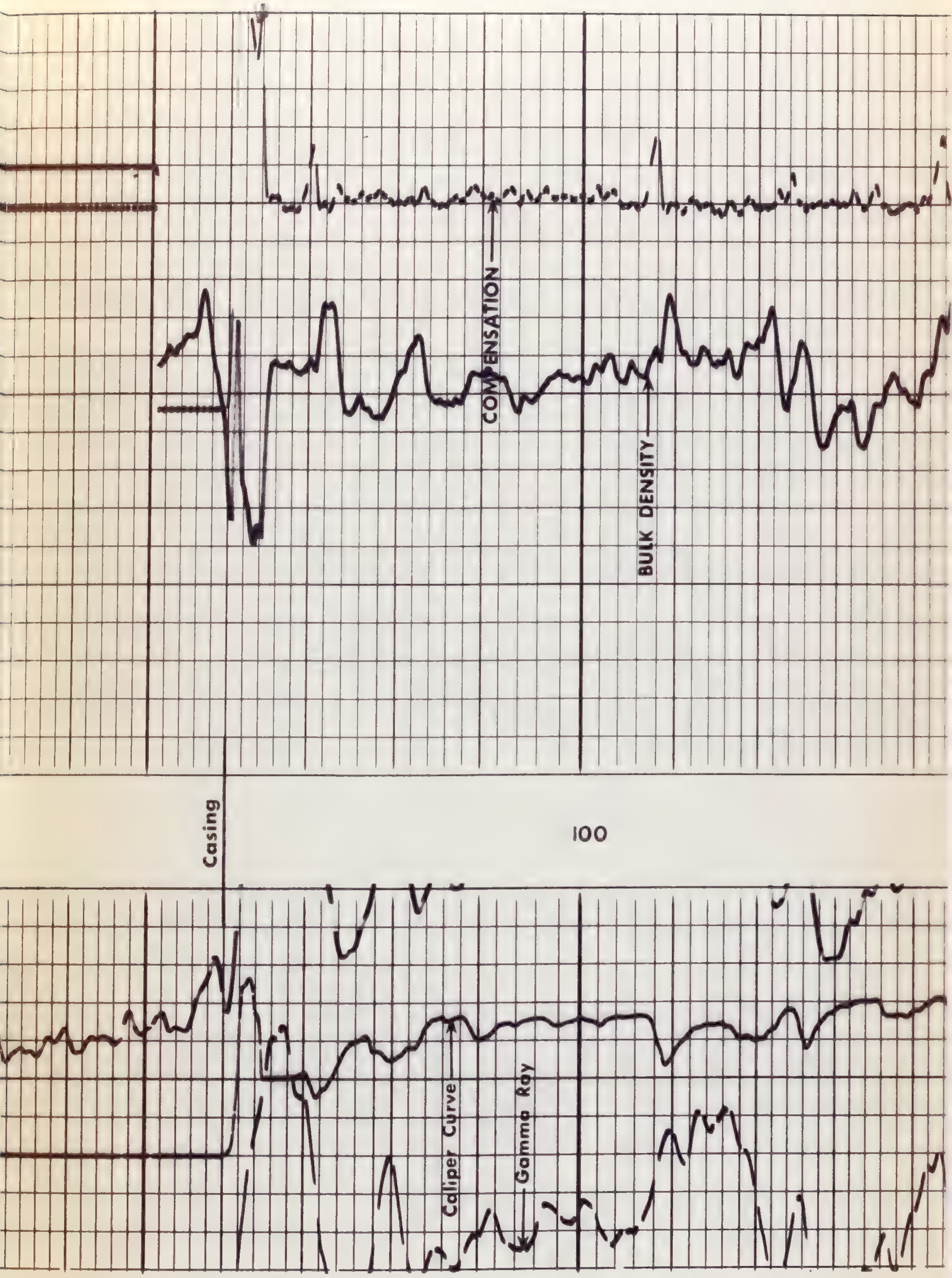

1600
1700
1800

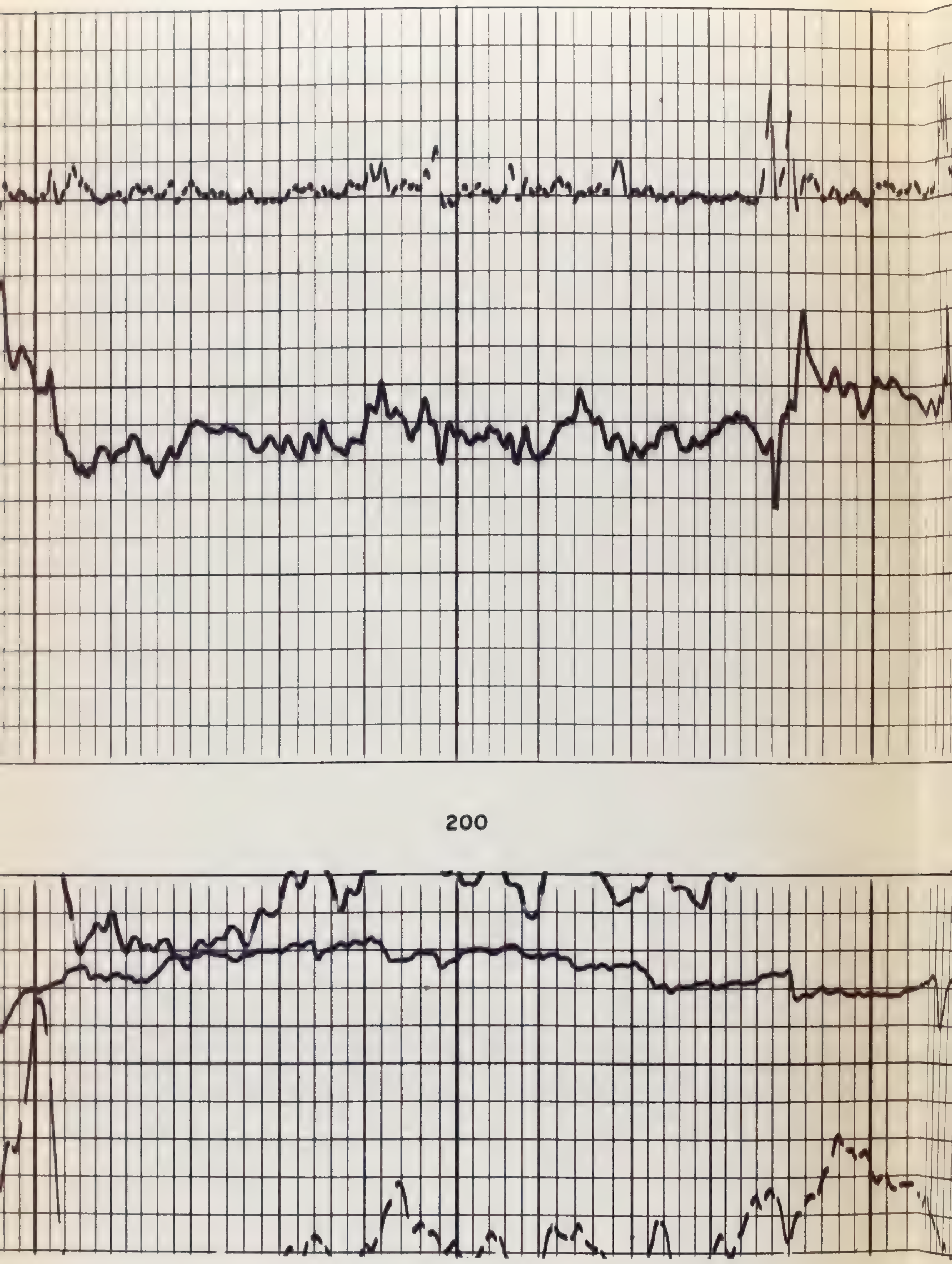

1900
2000
2100
220


BULK DENSITY
COMPENSATION
2200
2300
2400
Caliper Curve
Gamma Ray

DETAIL LOG


CALIPER
HOLE DIAM. IN INCHES
5
15
DEPTHS
−.25
0
+ .25
CORRECTION
GRAMS CC.
GAMMA RAY
API UNITS
BULK DENSITY
GRAMS CC.
CORRELATION GAMMA RAY
1.7
2.2
2.7
SEE REMARKS
.7
1.2
1.7
LR
0000


COMPENSATION
BULK DENSITY
Casing
100
Caliper Curve
Gamma Ray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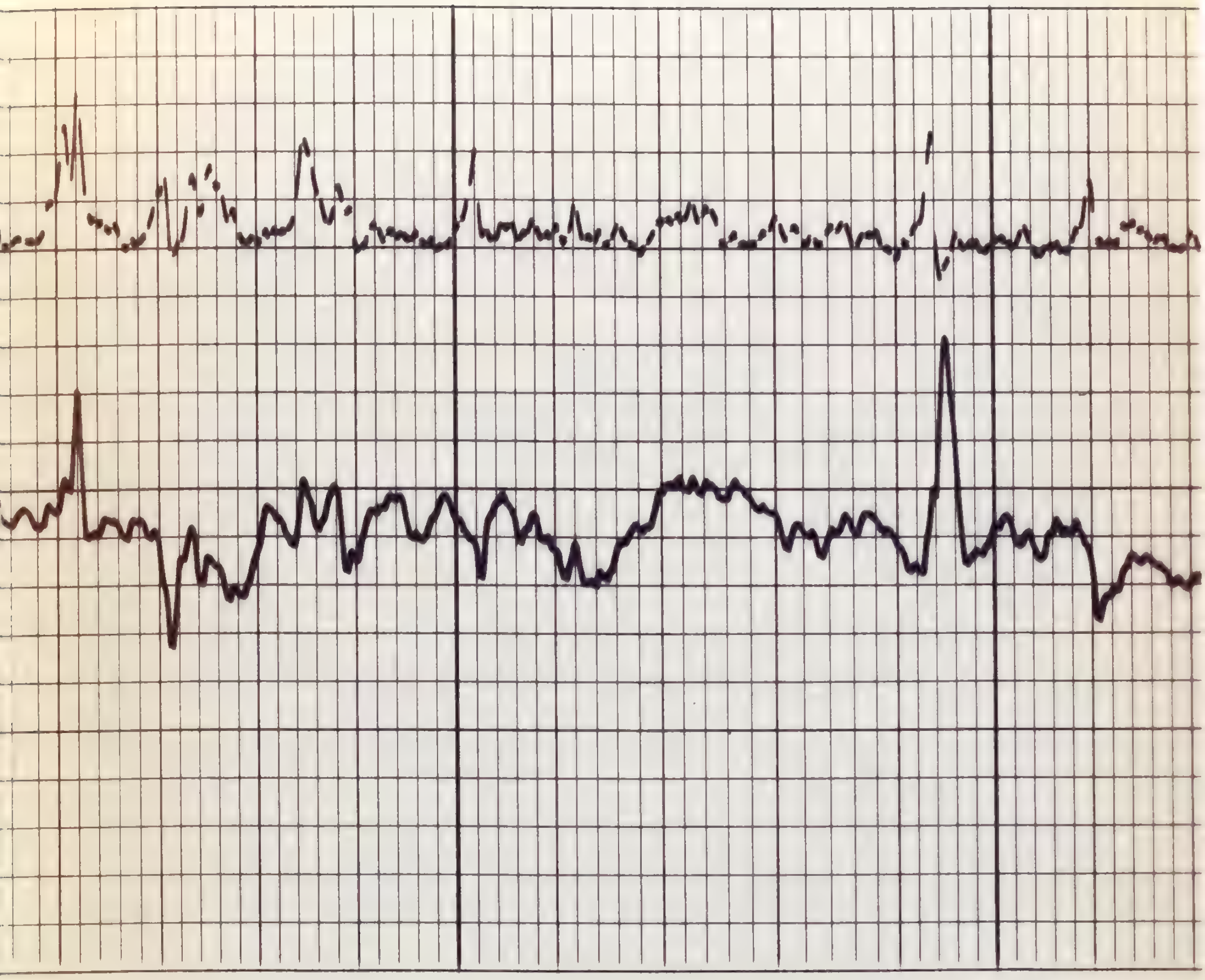

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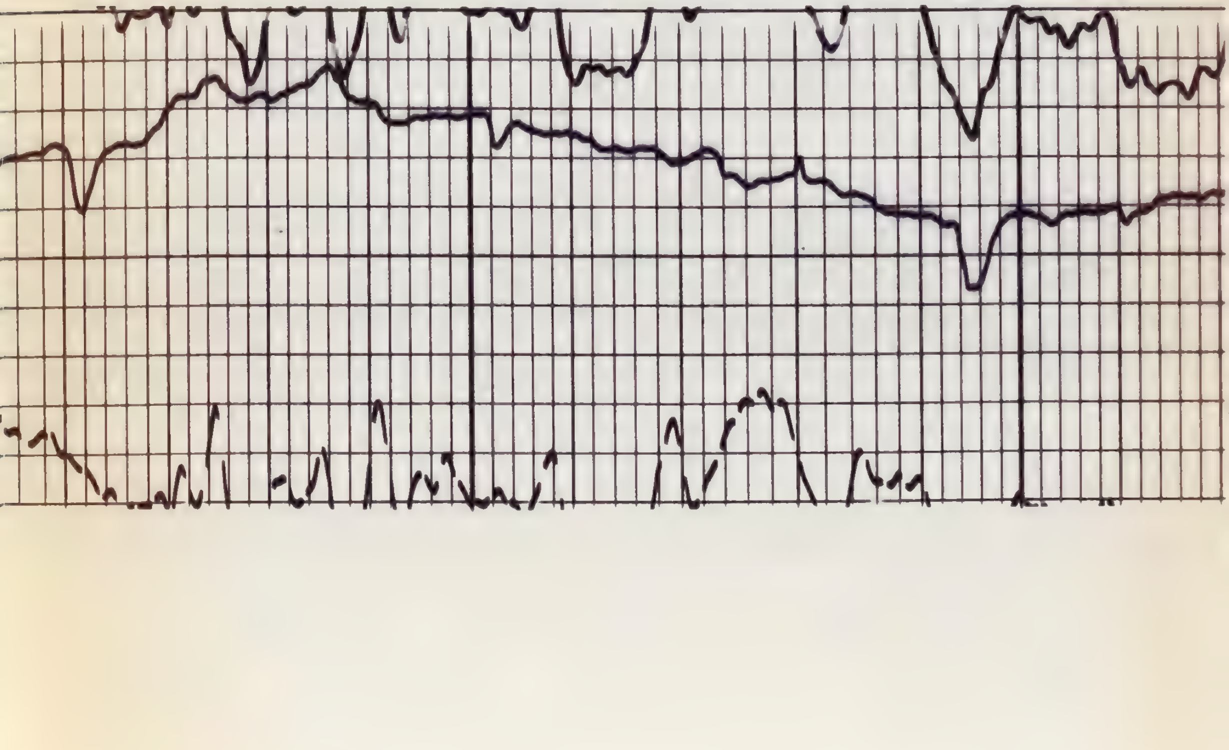

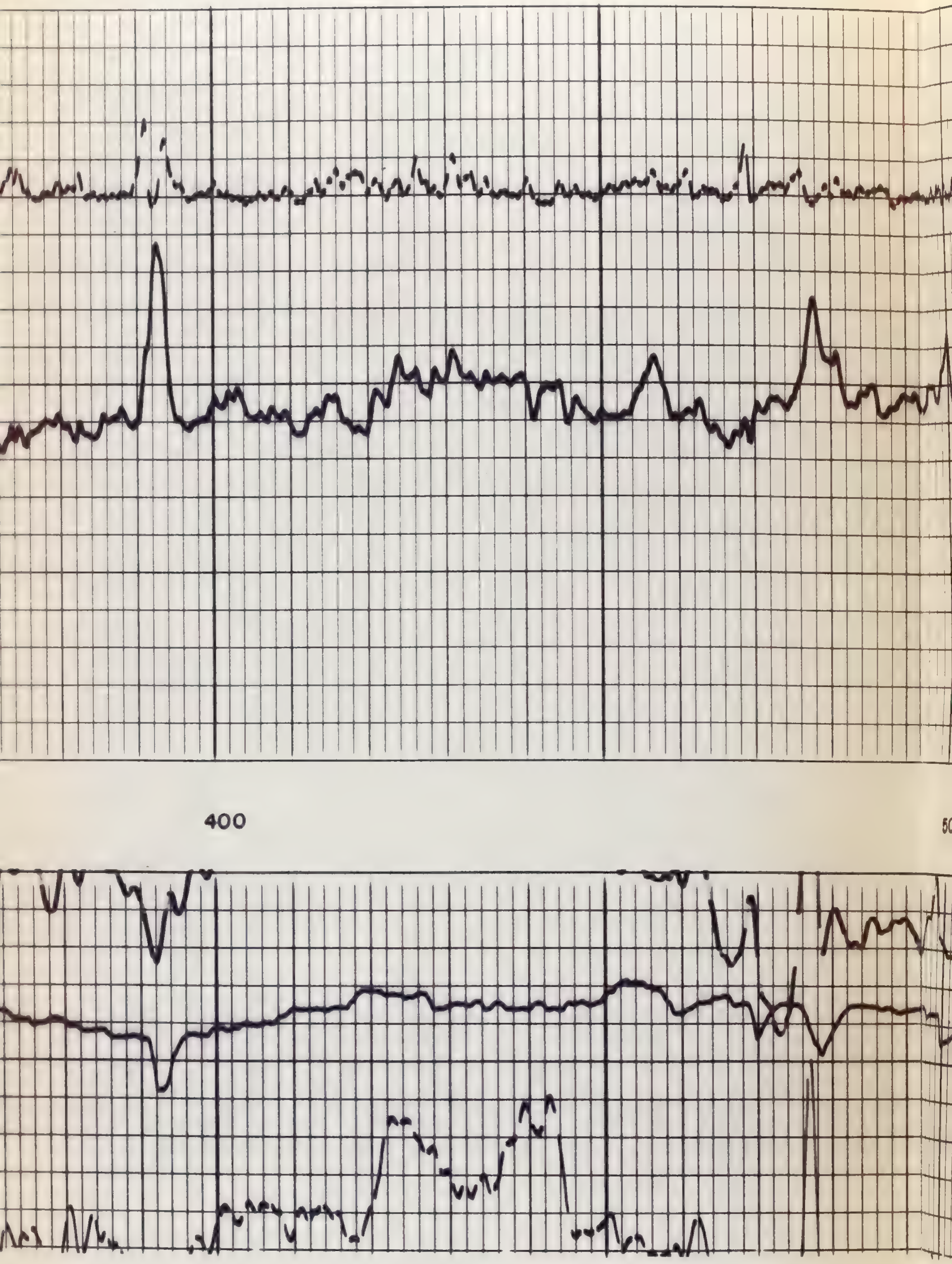
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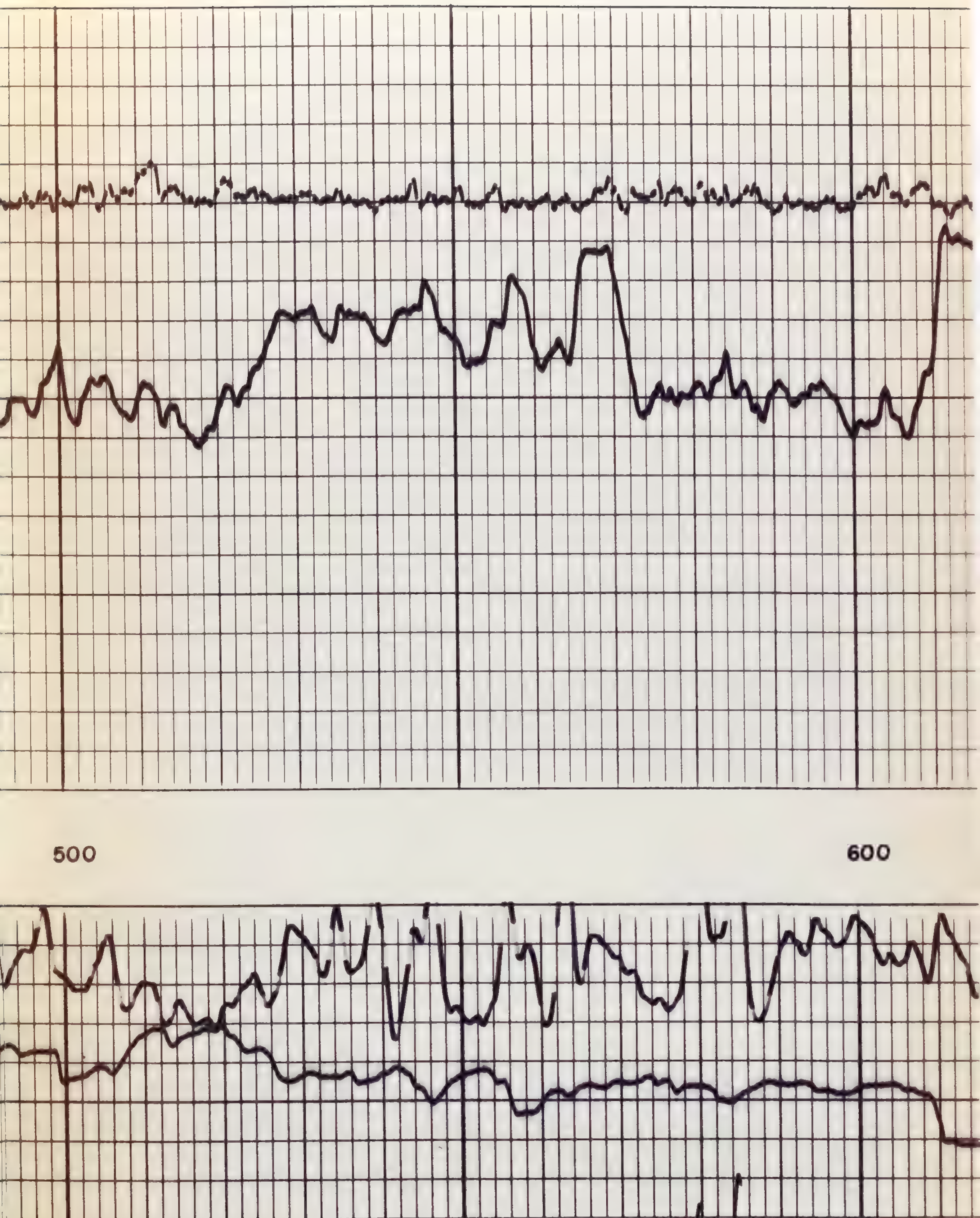
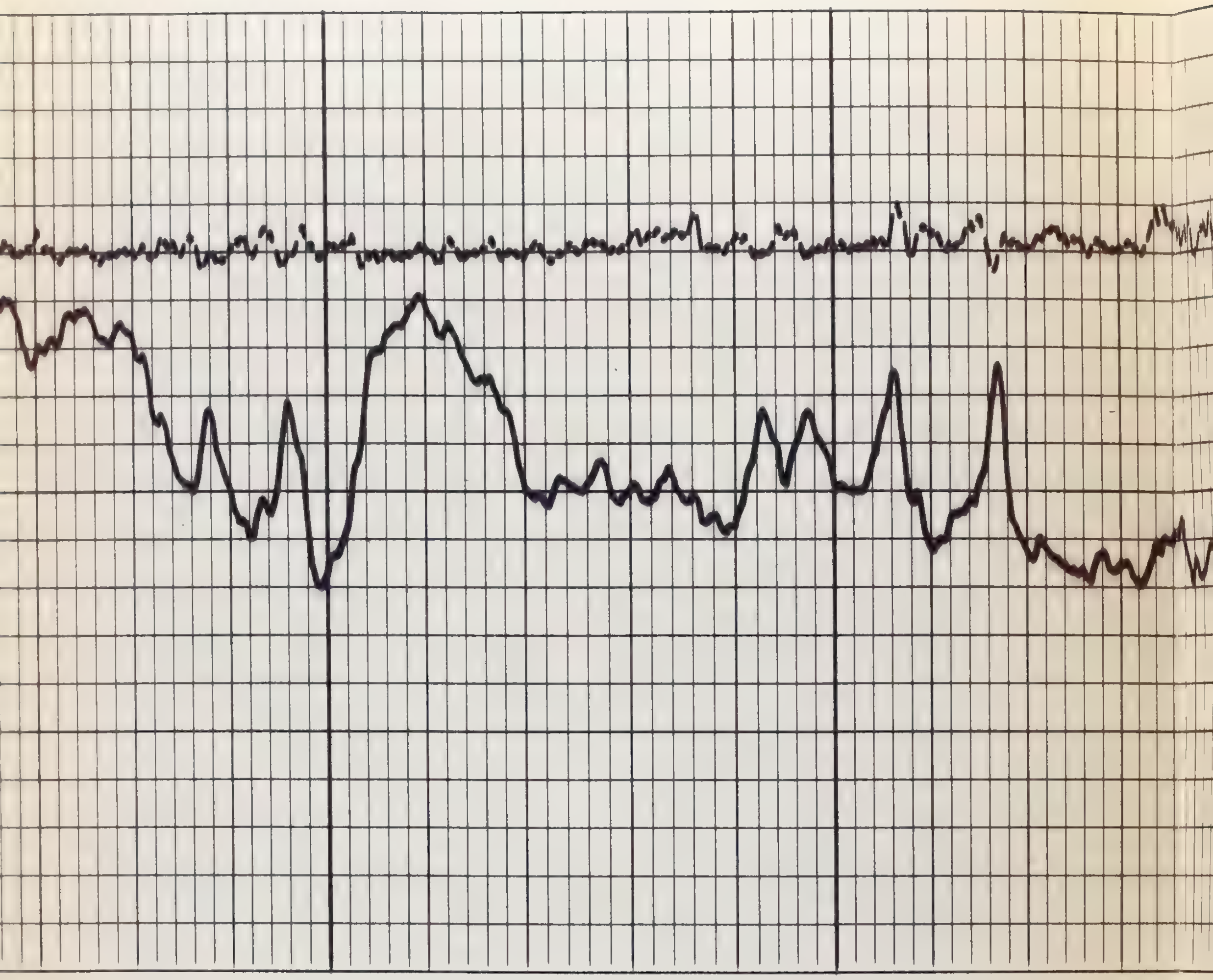
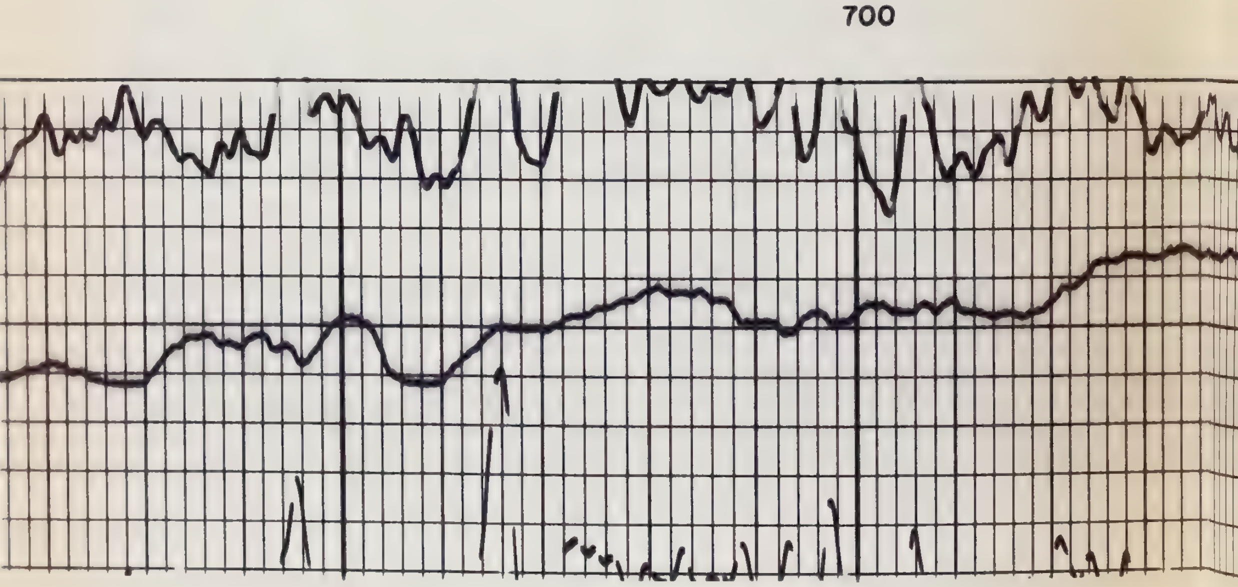

500
600

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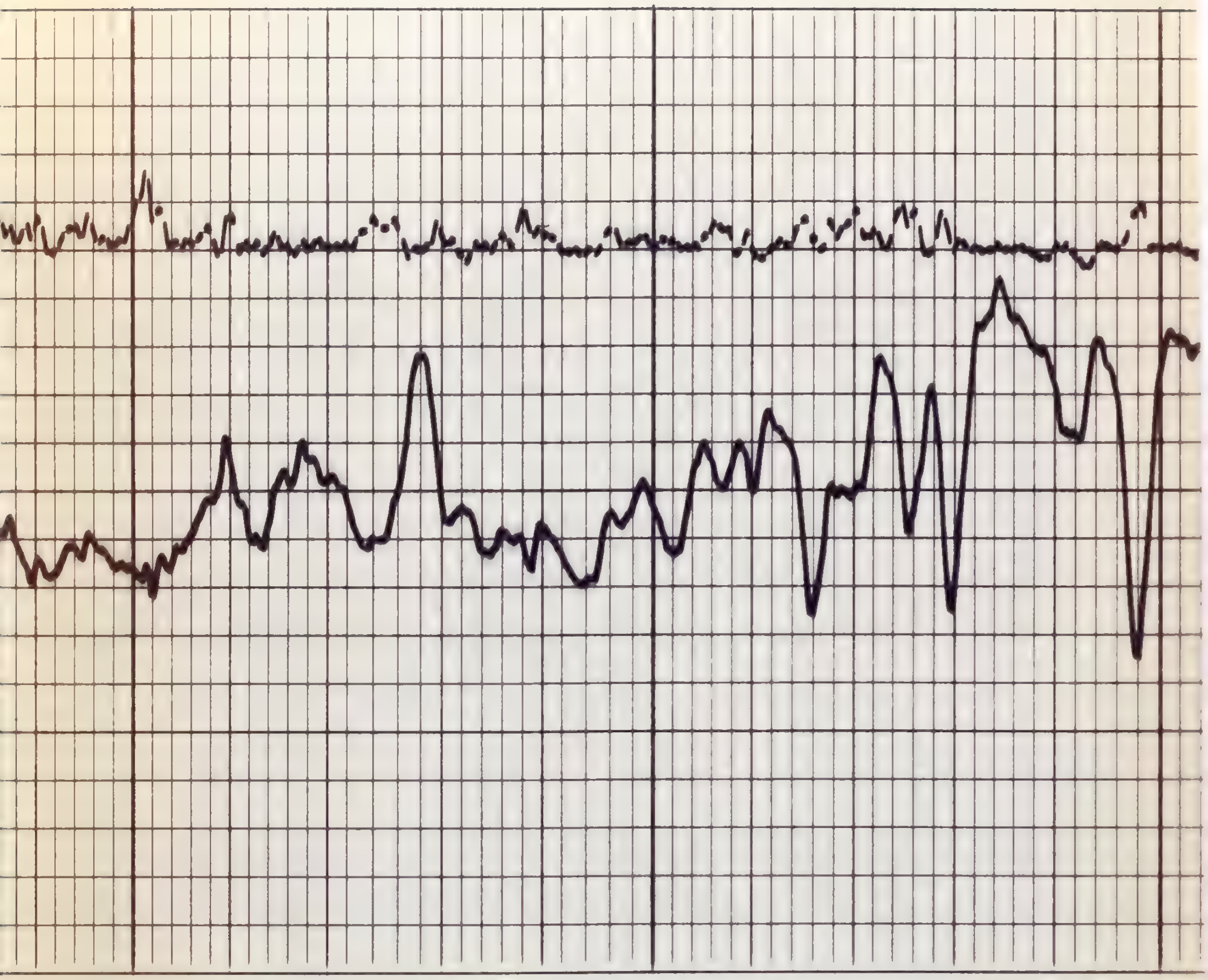

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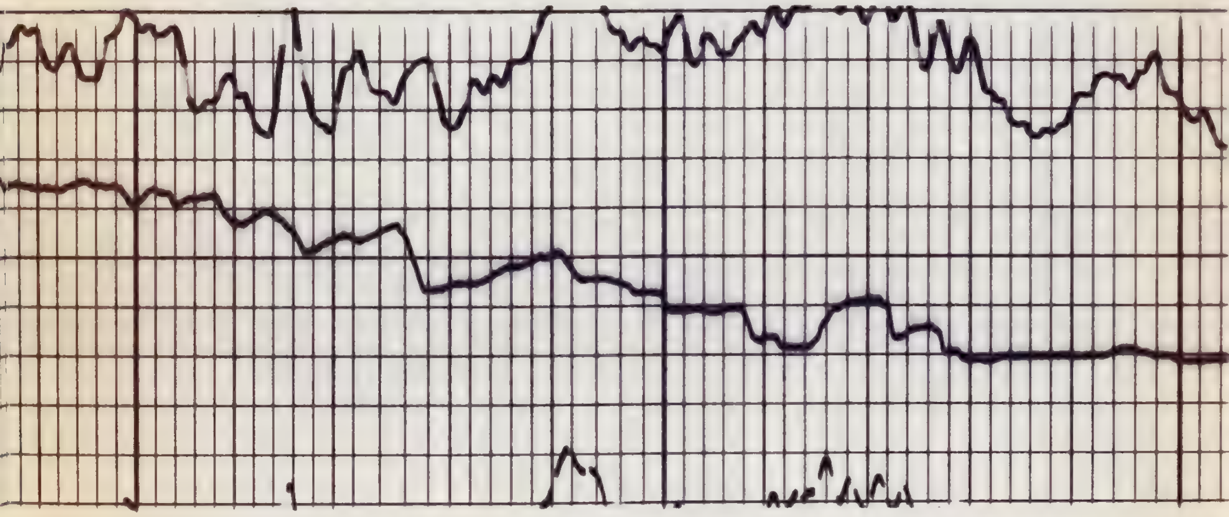

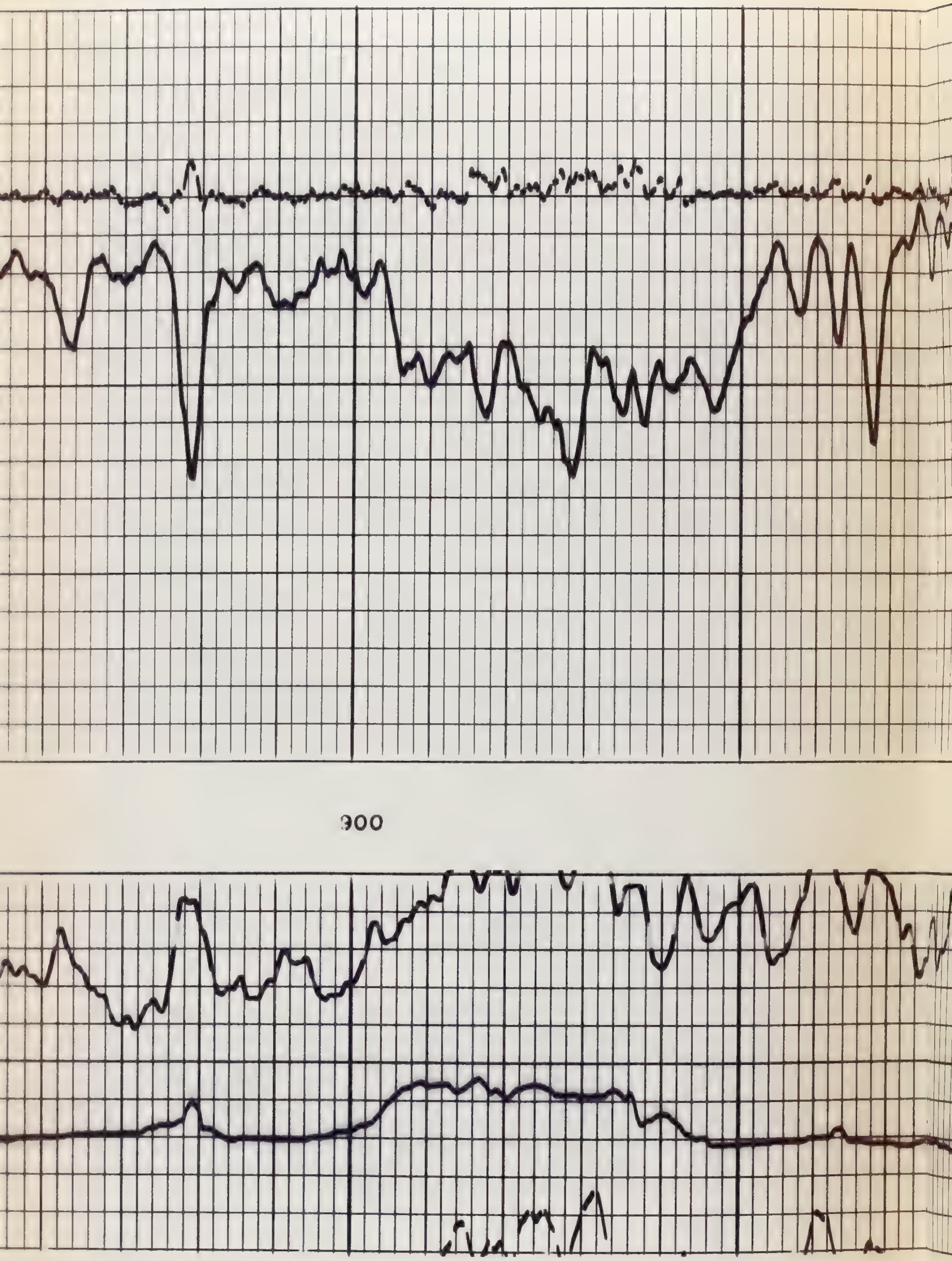
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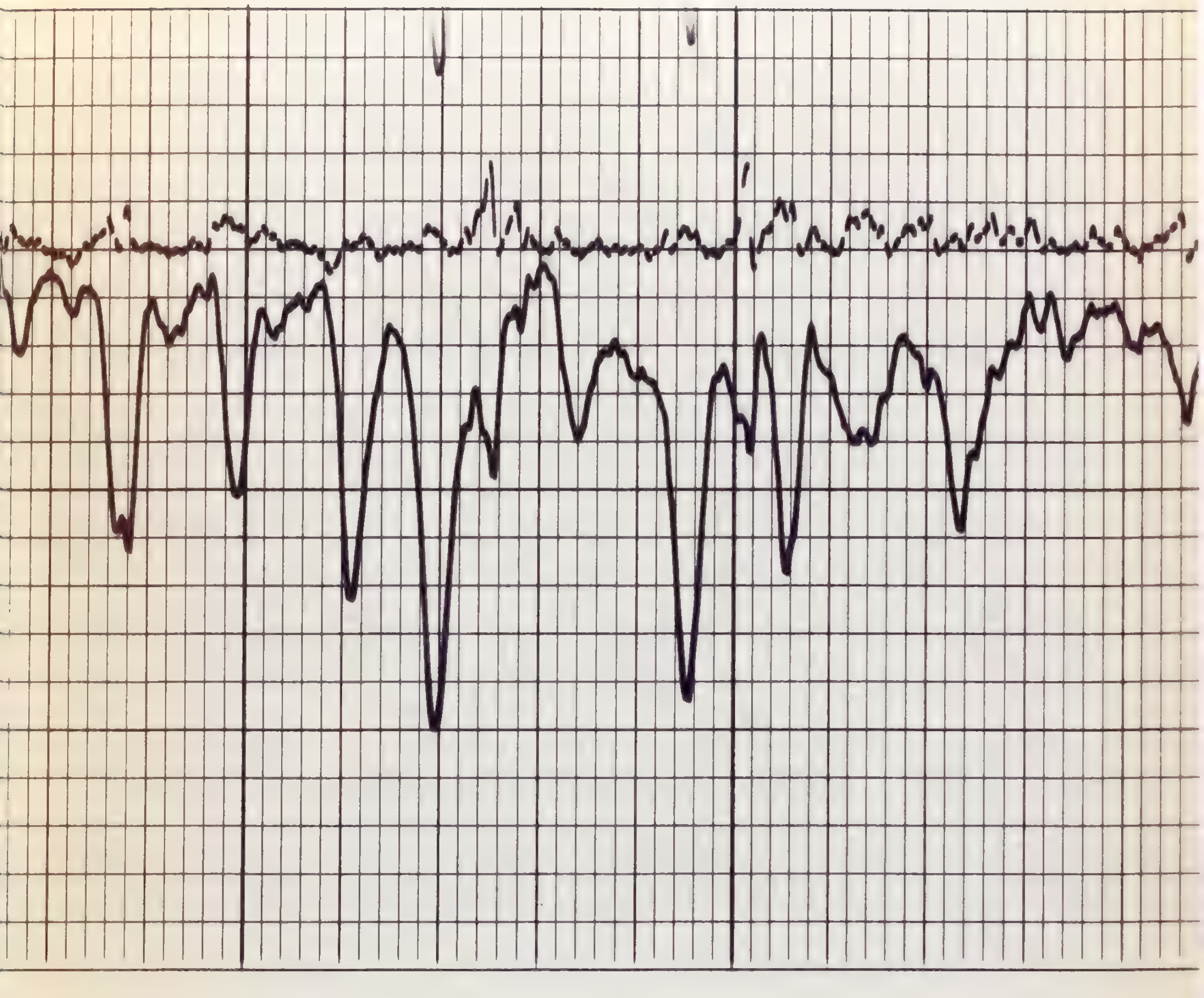
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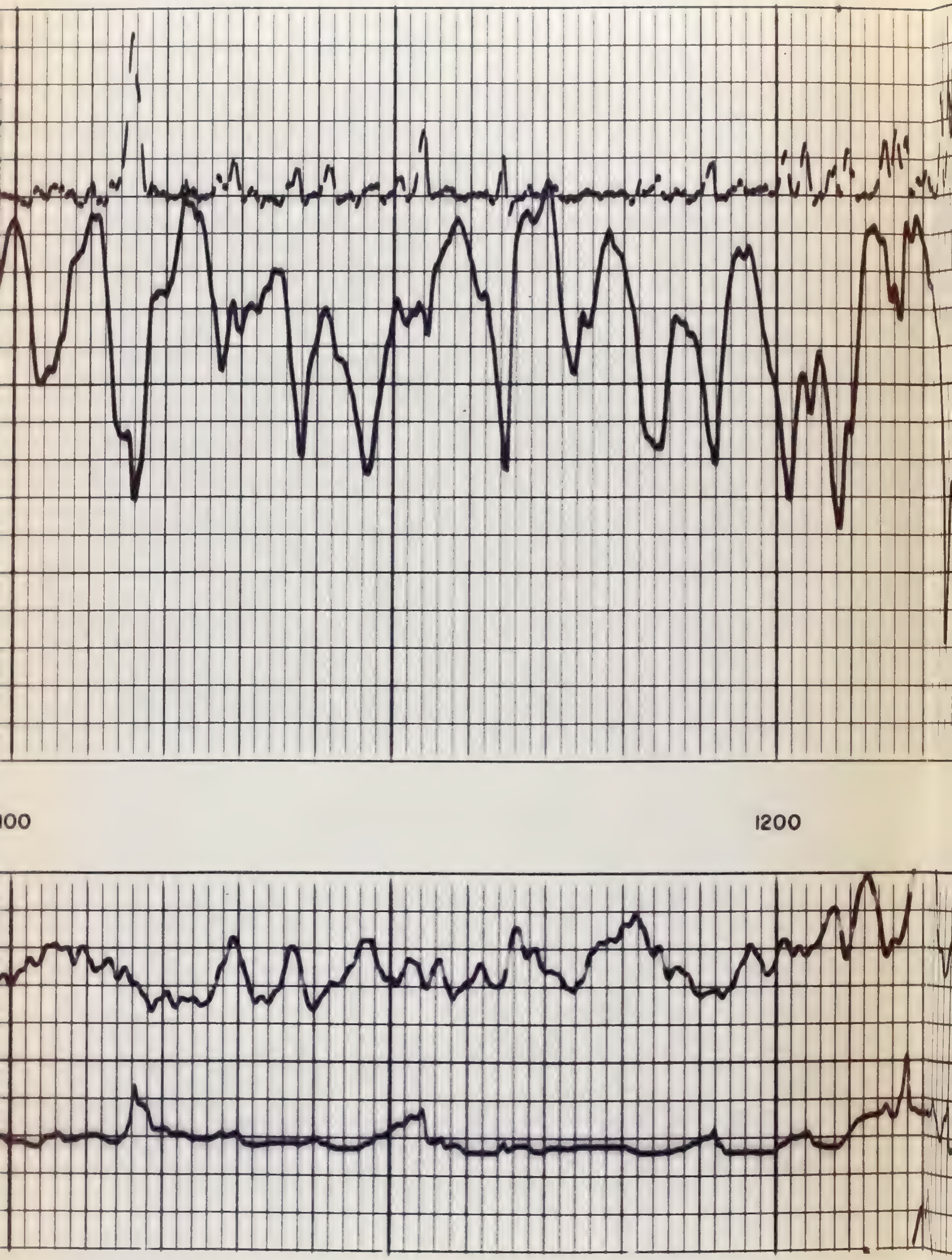
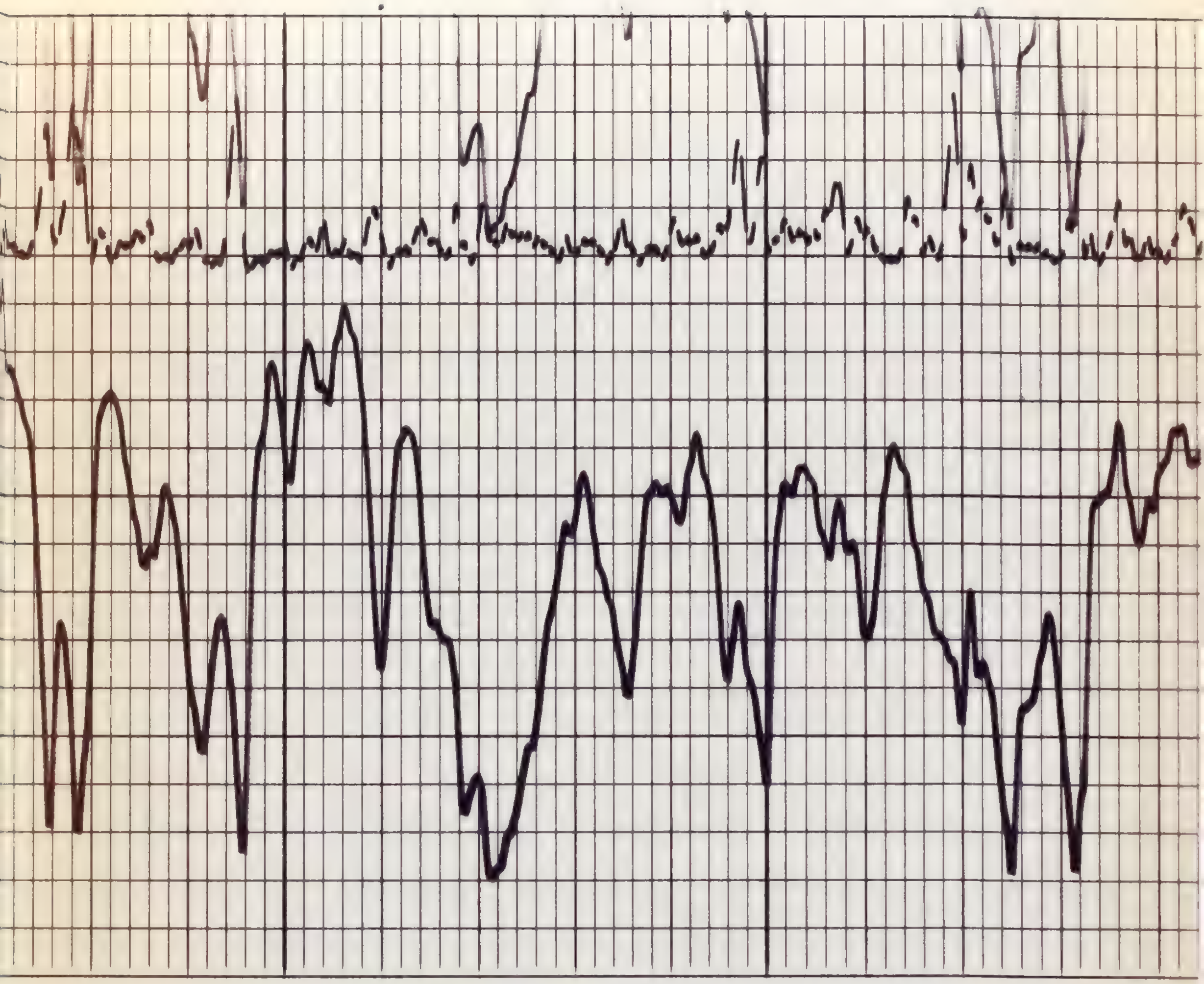

100
1200



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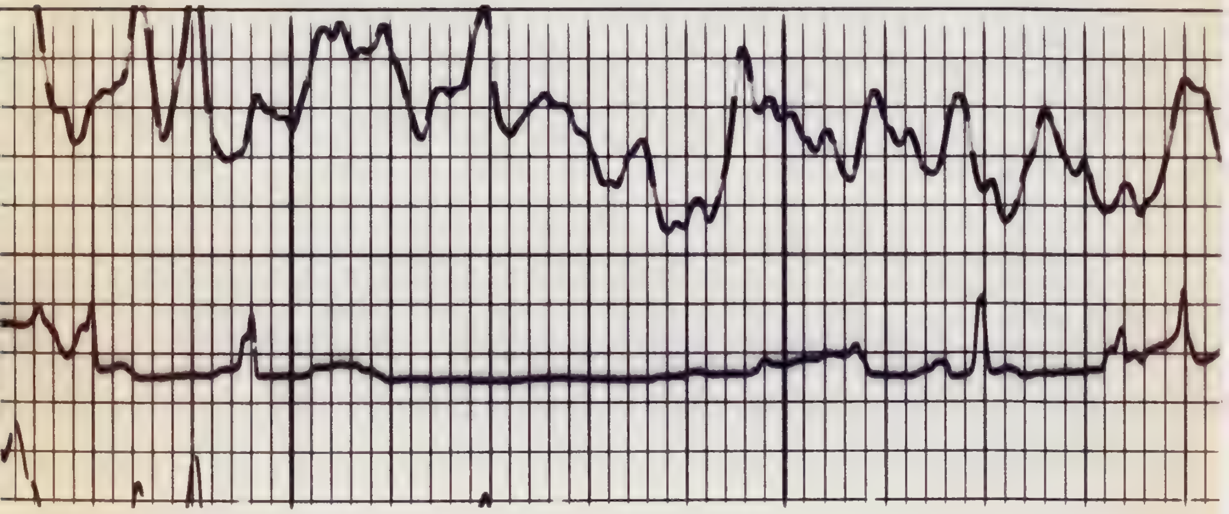

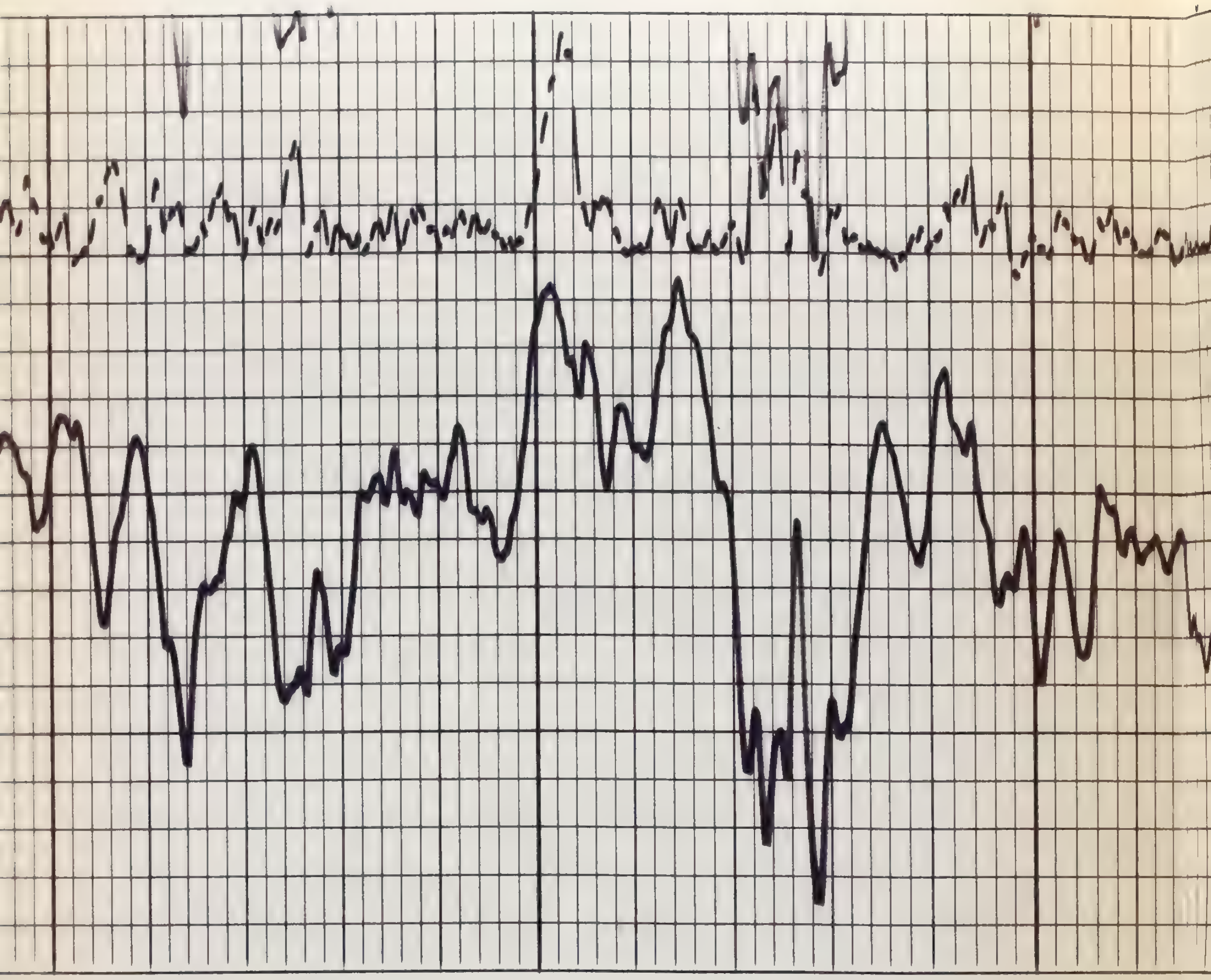

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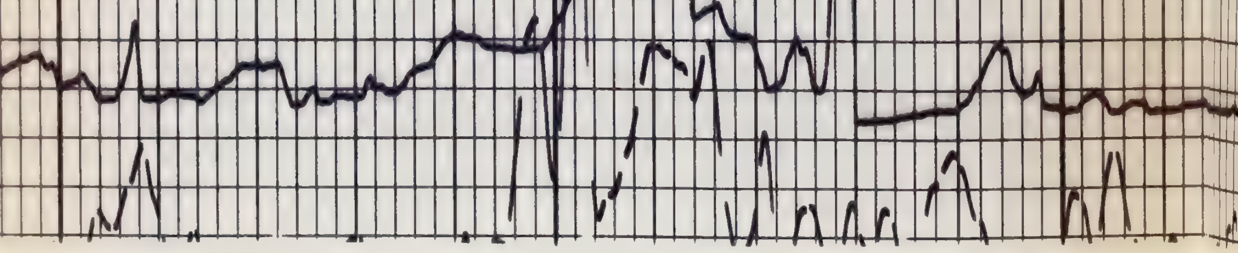

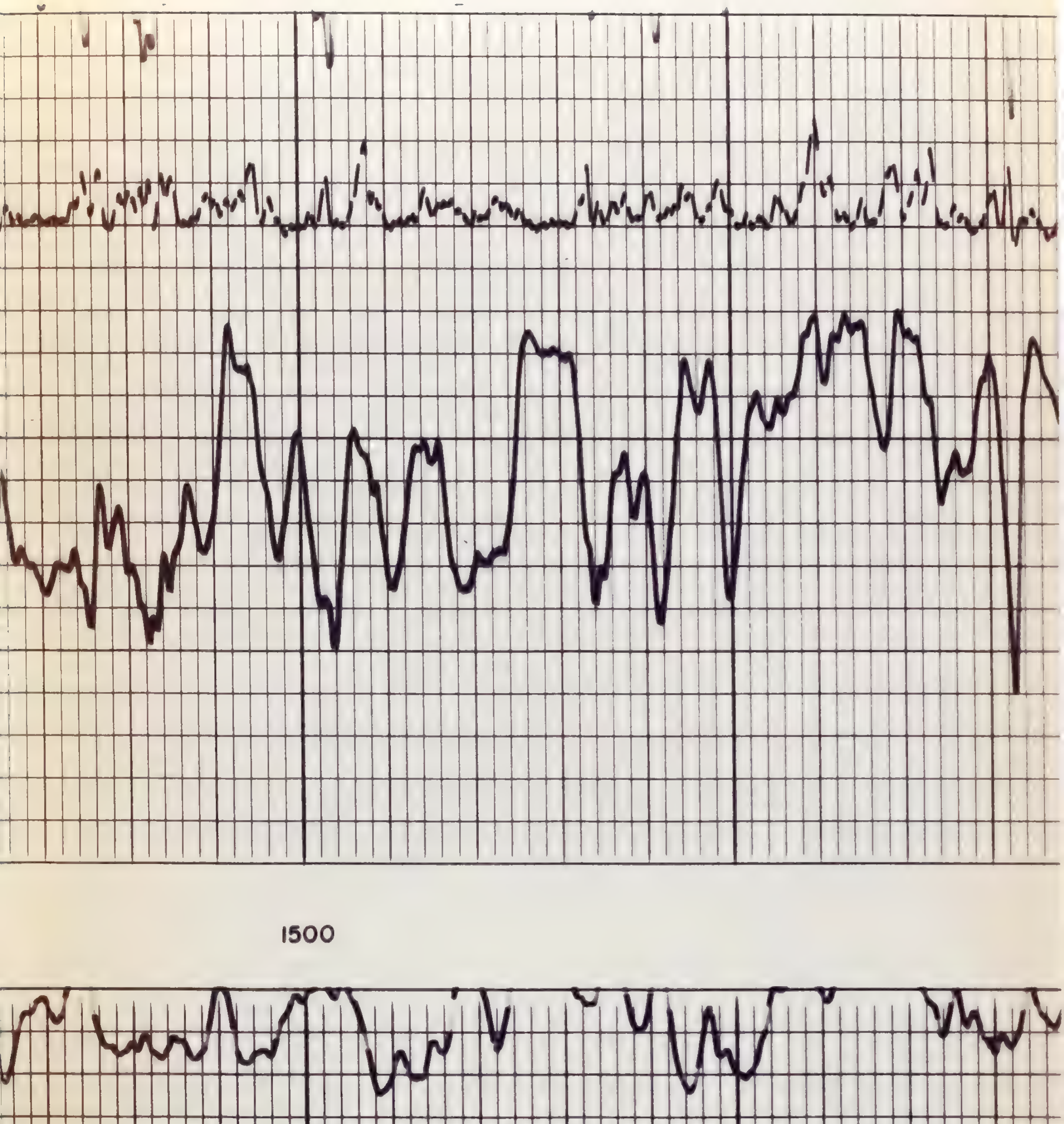
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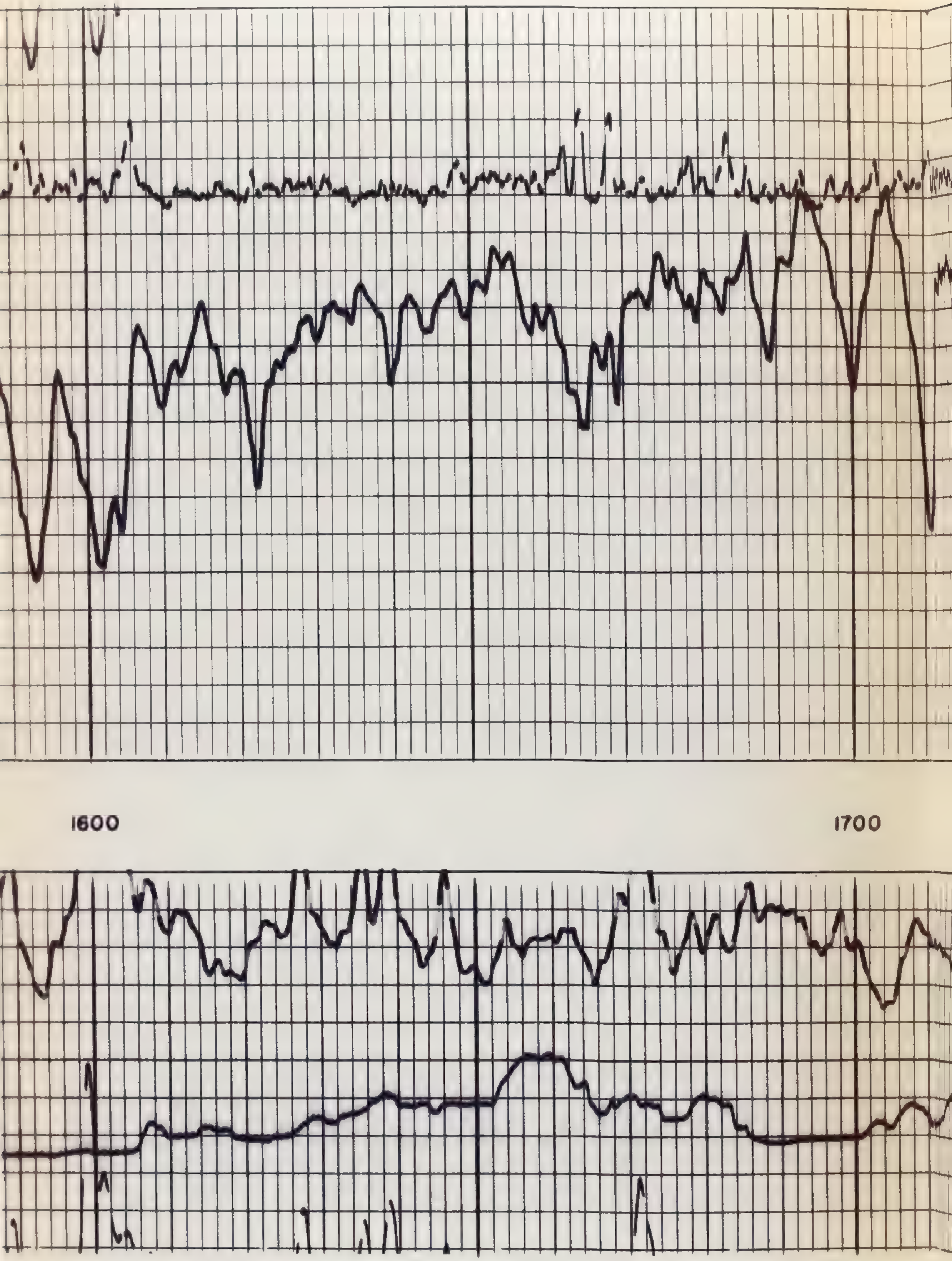
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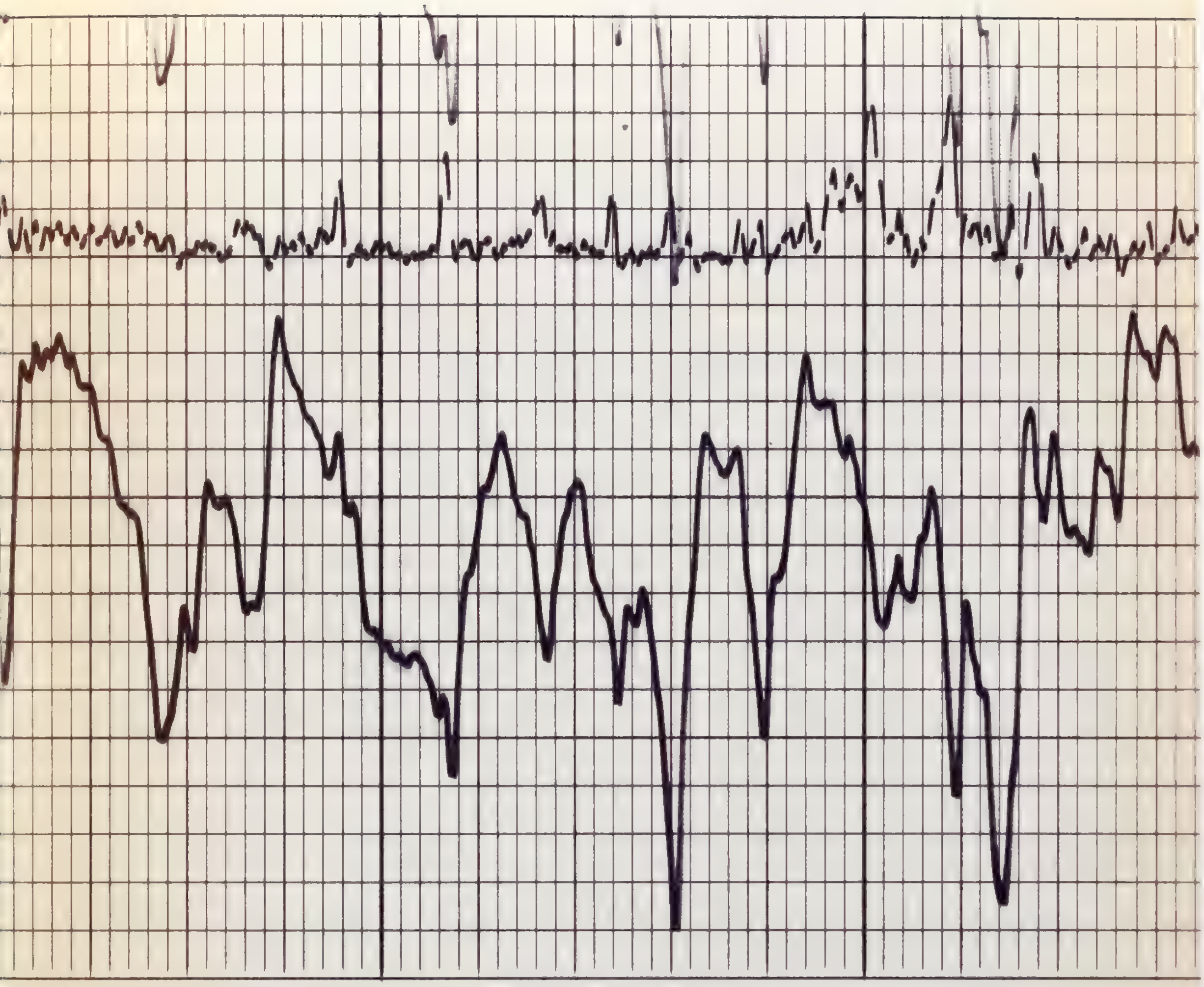
1700



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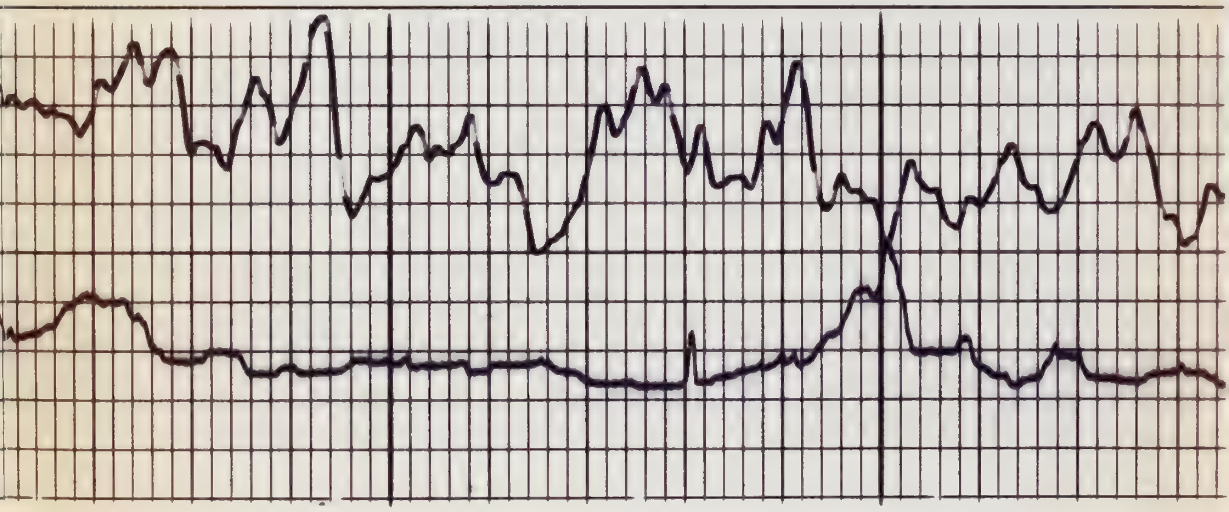

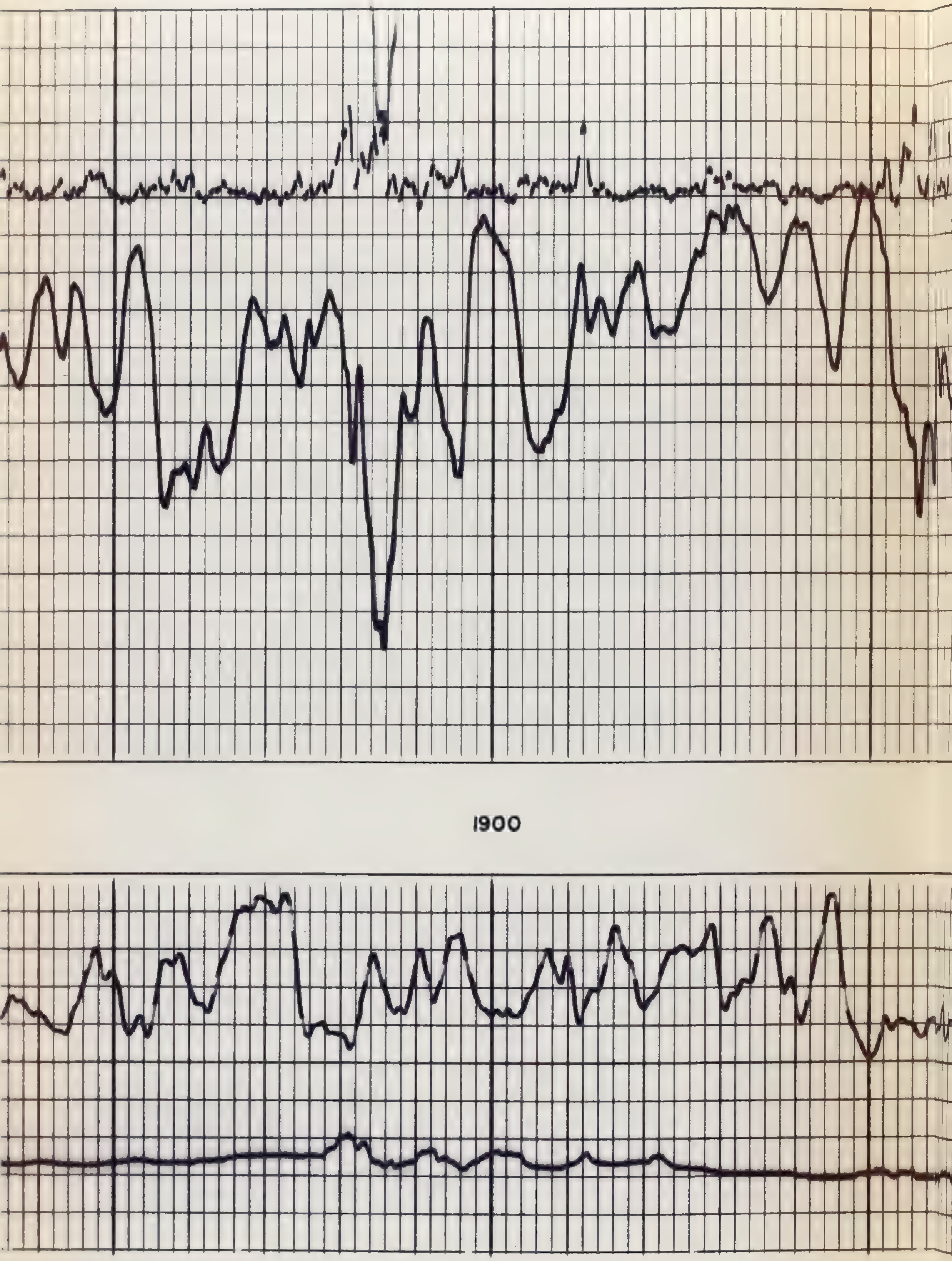
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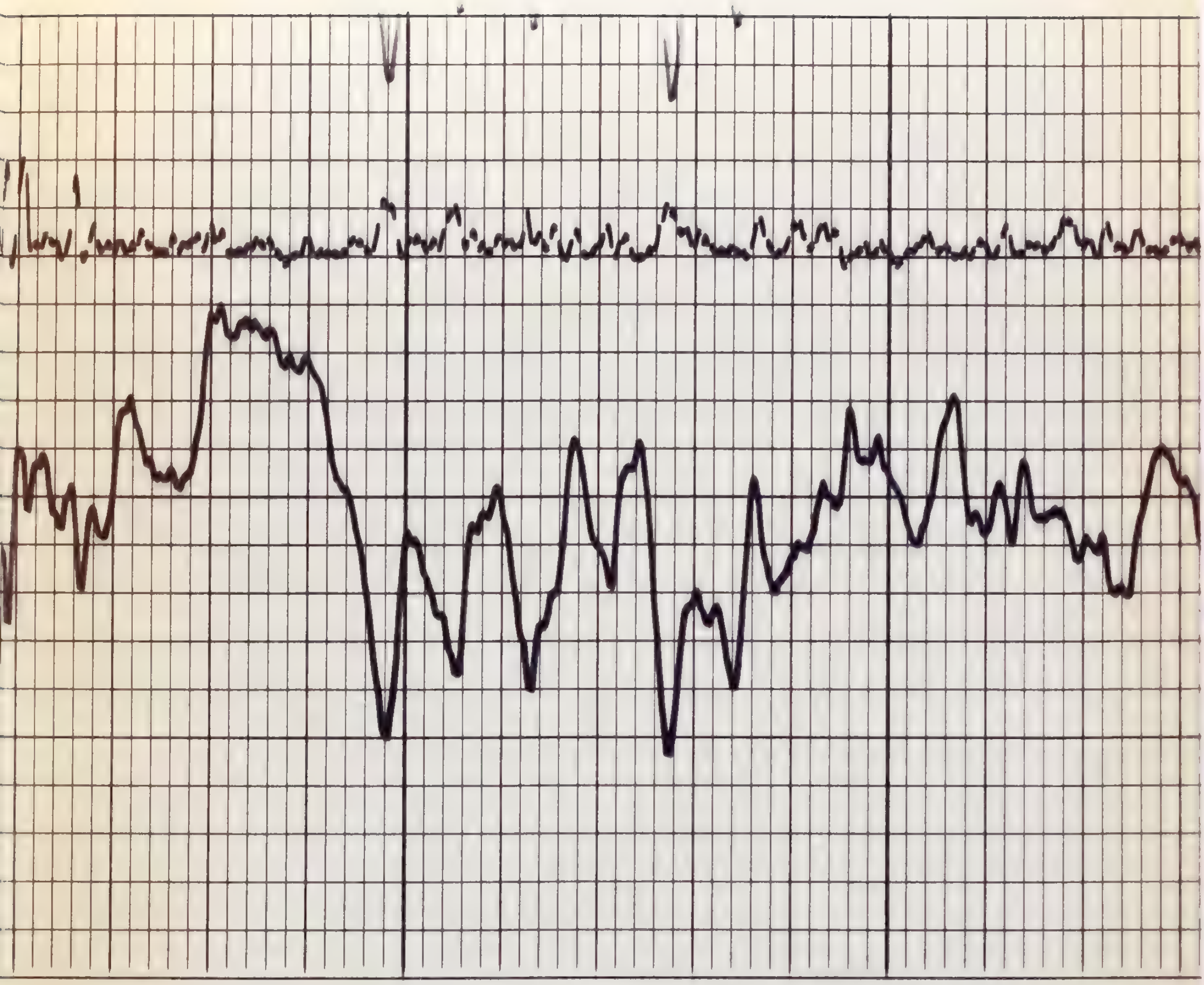

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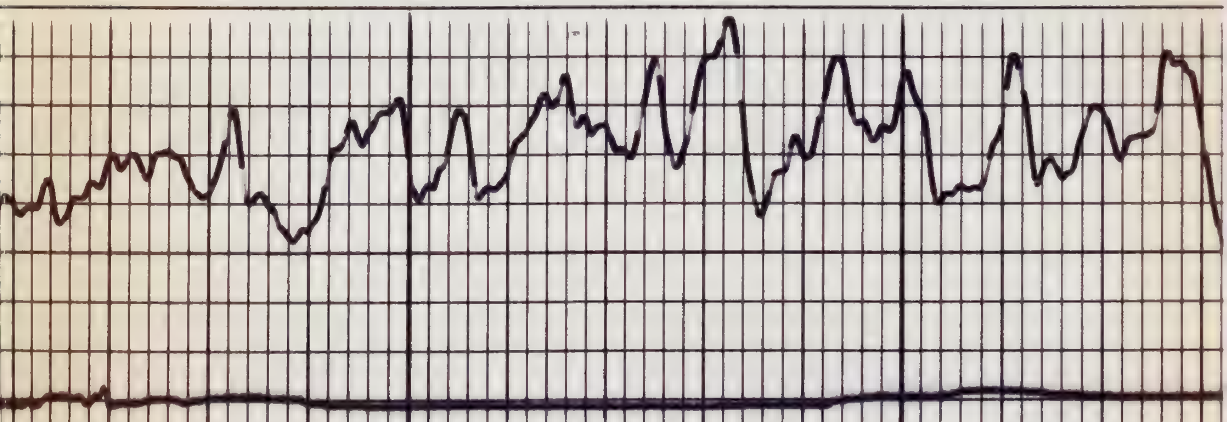

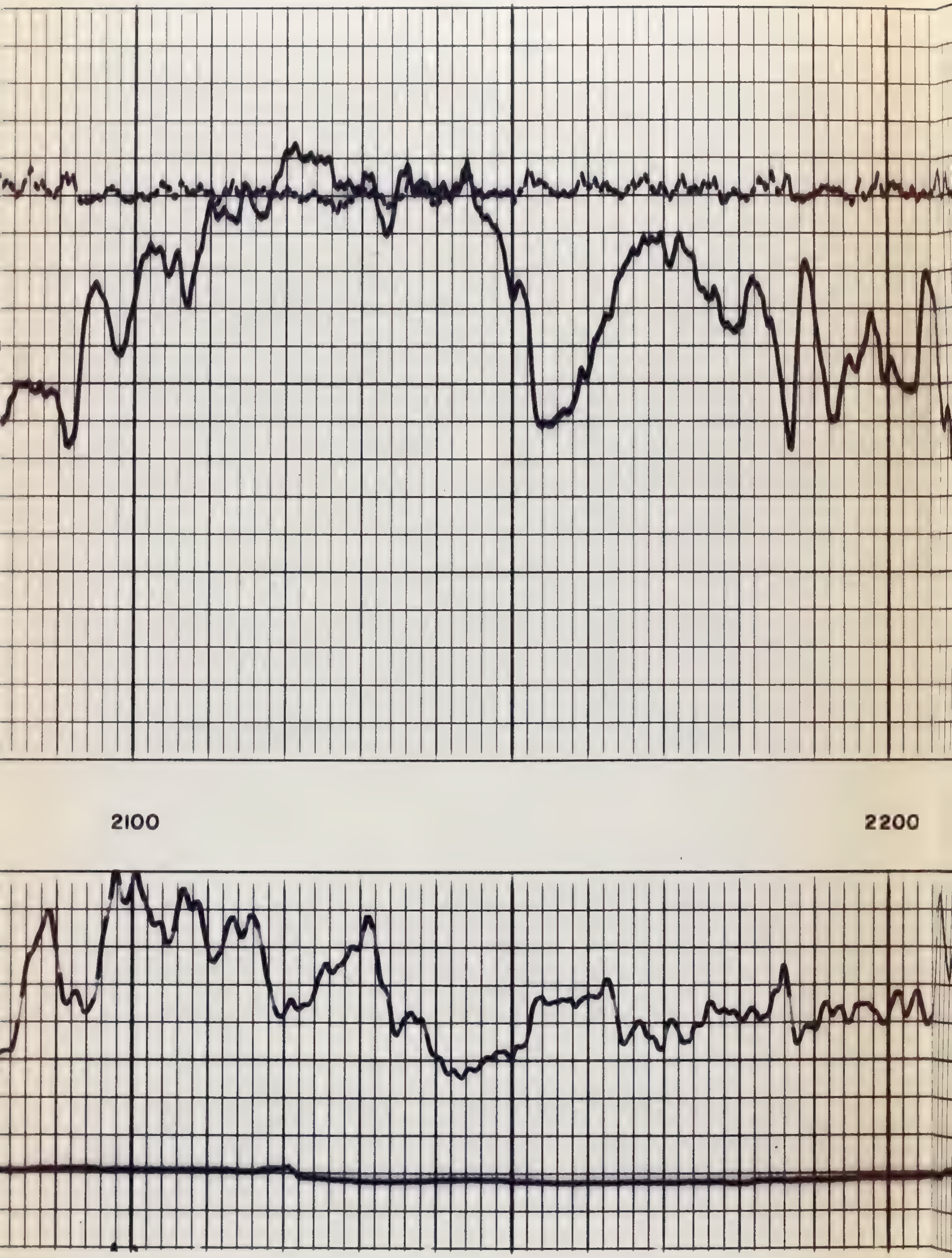
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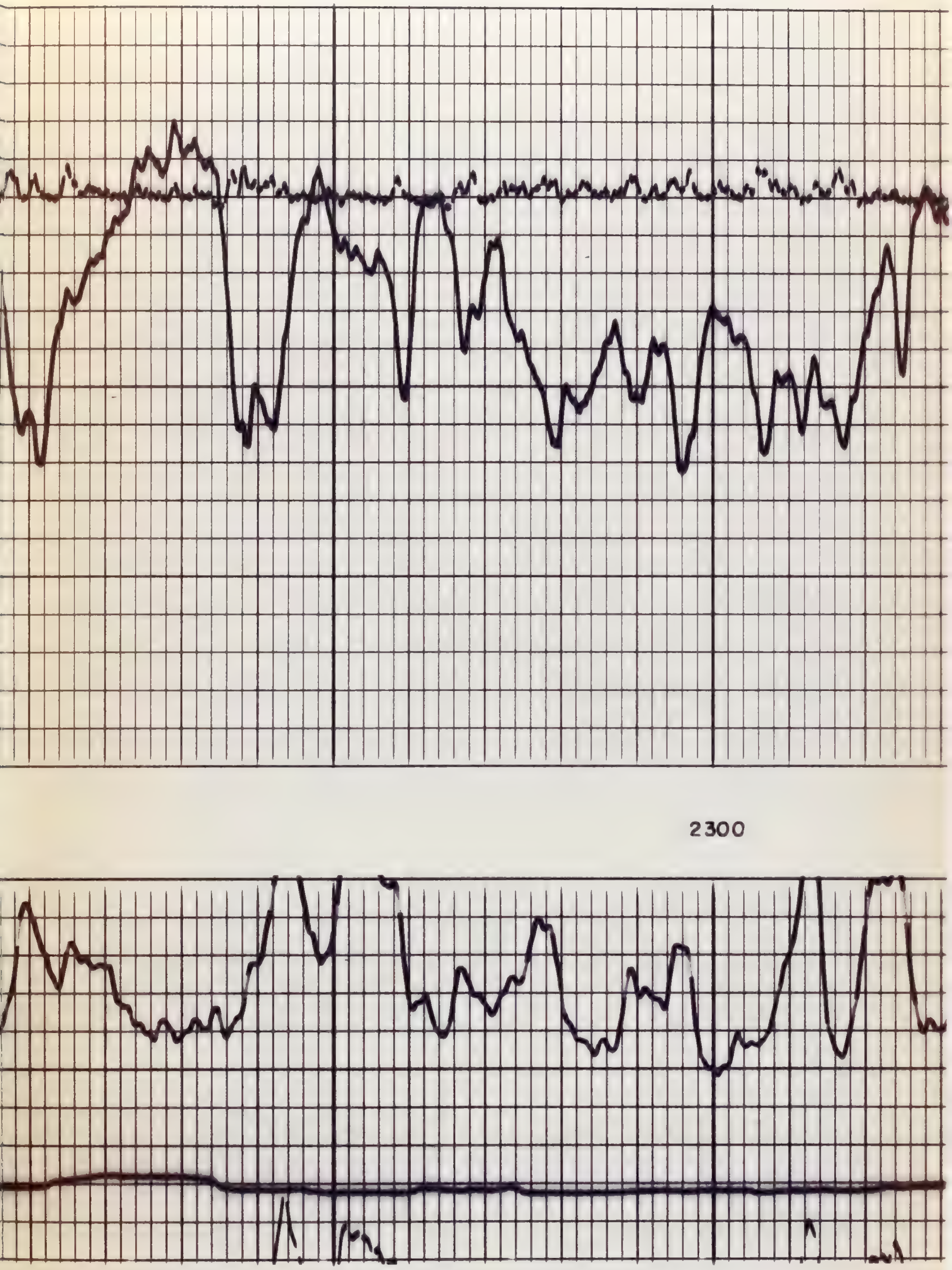
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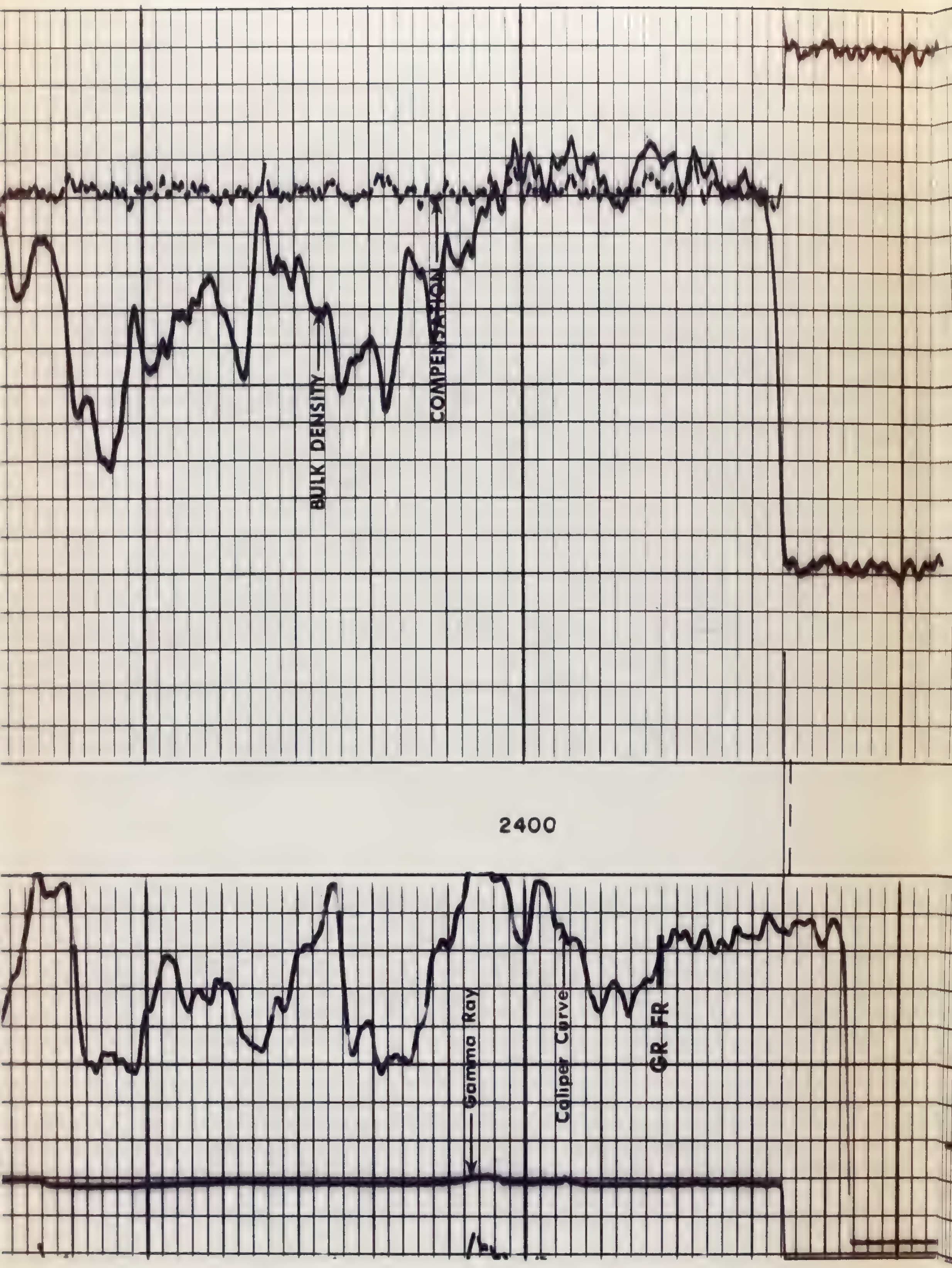
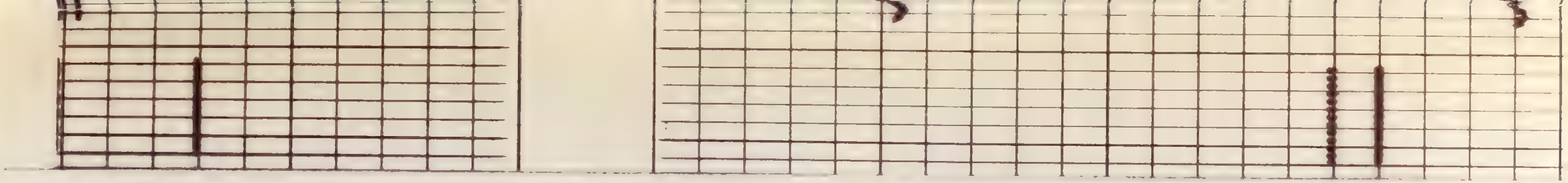
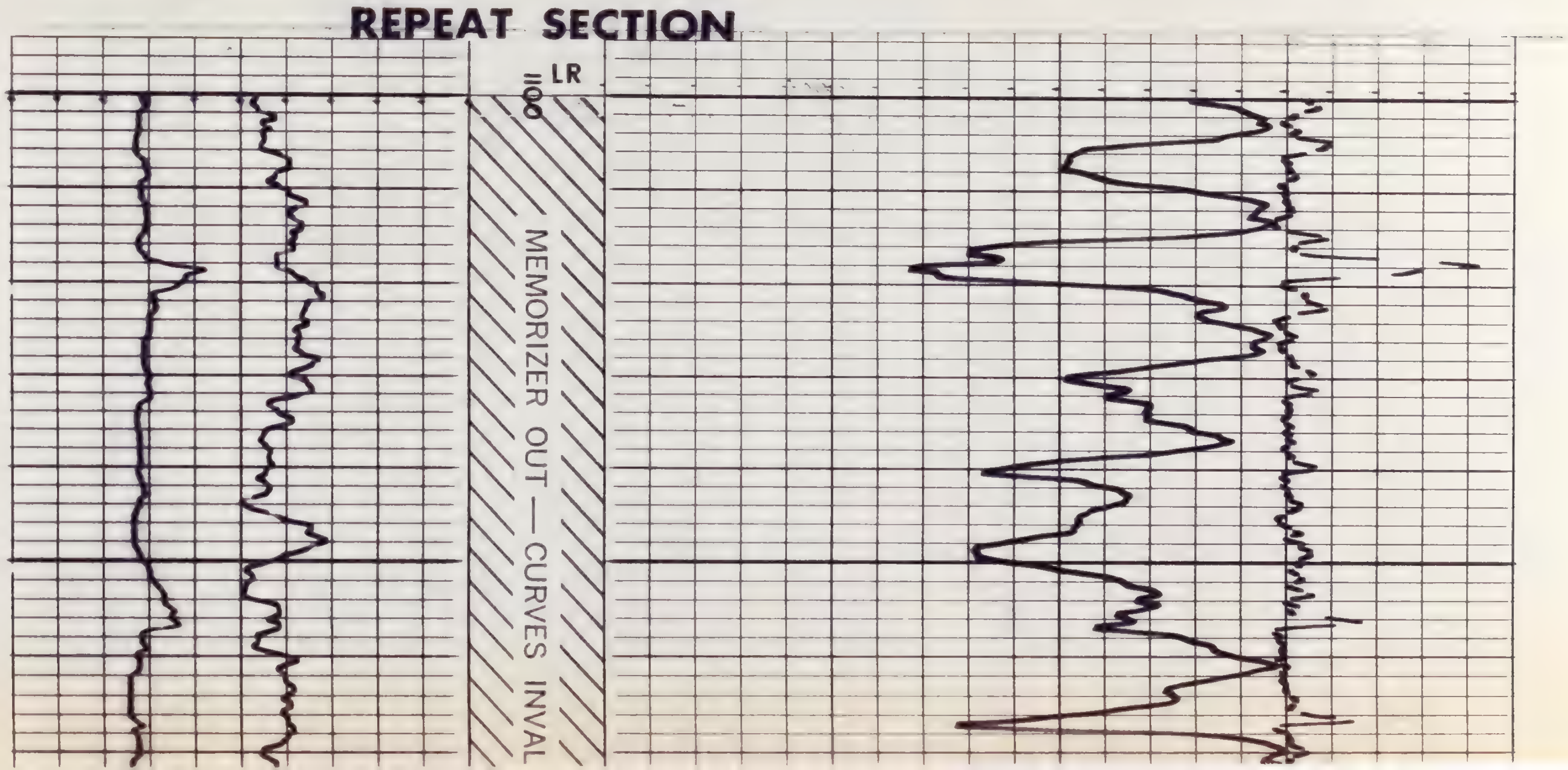
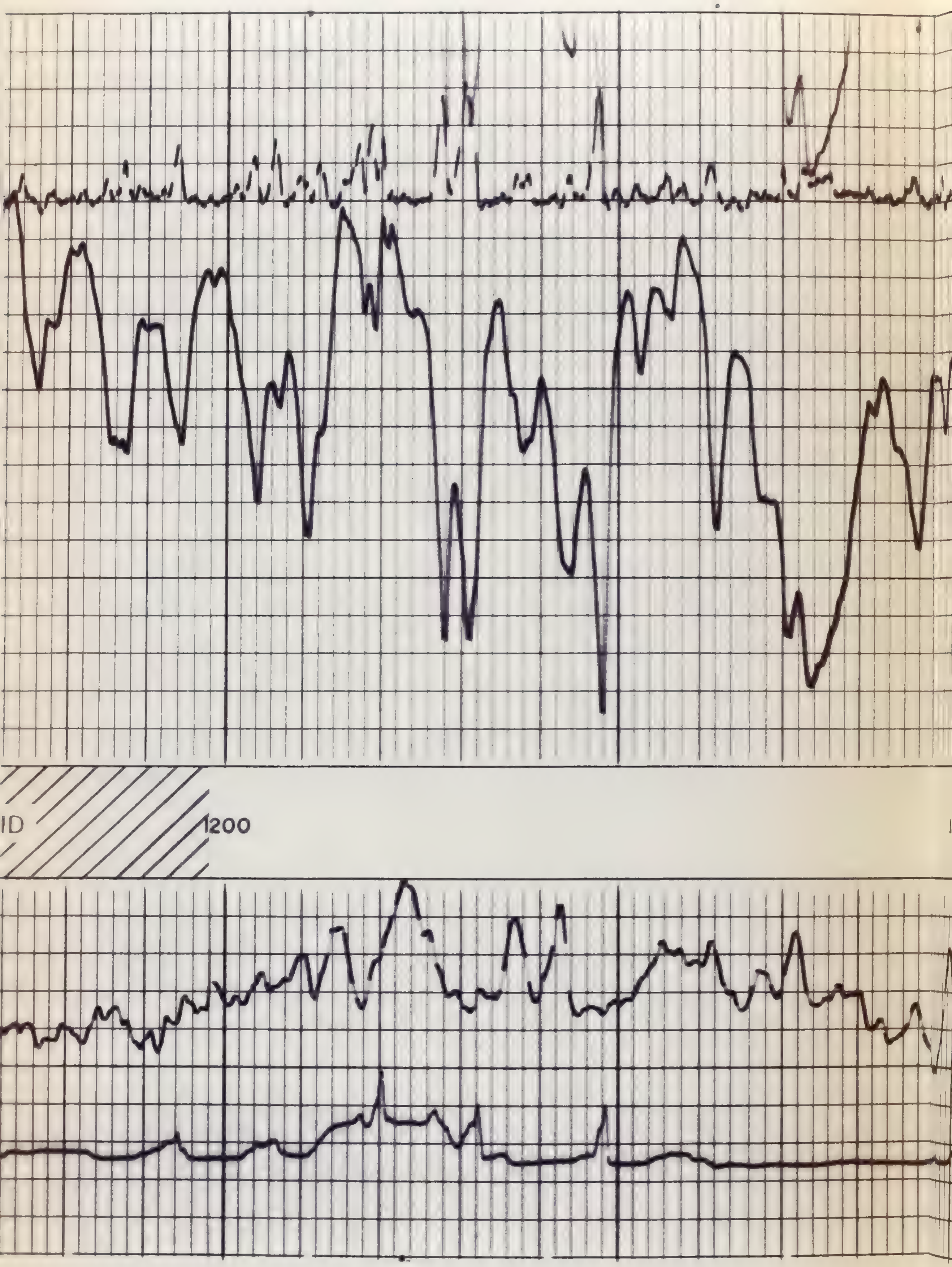

BULK DENSITY
COMPENSATION
2400
Gamma Ray
Caliper Curve
GR FR




REPEAT SECTION
LR
1100
MEMORIZER OUT — CURVES INVAL


ID
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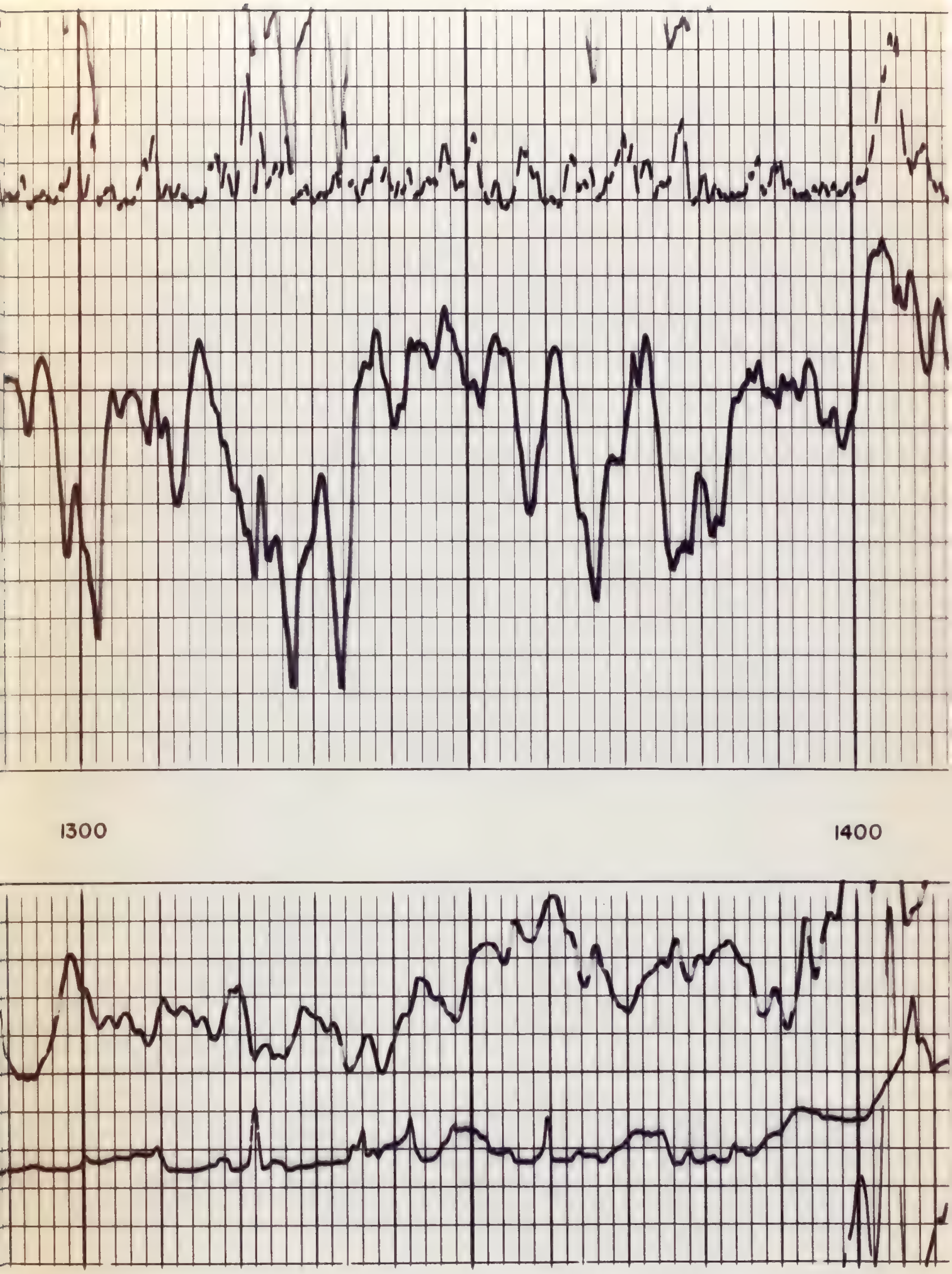
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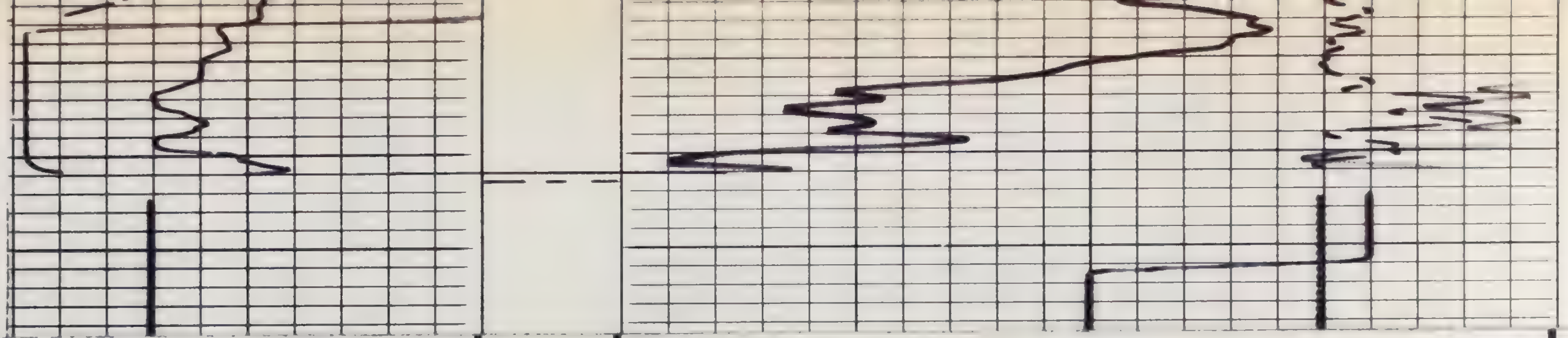


CORRELATION GAMMA

RAY; SEE REMARKS

GAMMA RAY

API UNITS

5 15

CALIPER

HOLE DIAM. IN INCHES

DEPTHS

1.7 2.2 2.7

.7 1.2 1.7

BULK DENSITY

GRAMS/CC.

−.25 0 +.25

CORRECTION

GRAMS CC.

COMPANY ATLANTIC RICHFIELD COMPANY	Rm ____ @ ____ °F		SCHL. FR 2434
	BHT ____ °F		SCHL. TD 2435
WELL SORGHUM GULCH NO. 17			DRLR TD 2436
			Elev:
FIELD SORGHUM GULCH			KB 7044
COUNTY RIO BLANCO STATE COLORADO			GL 7036

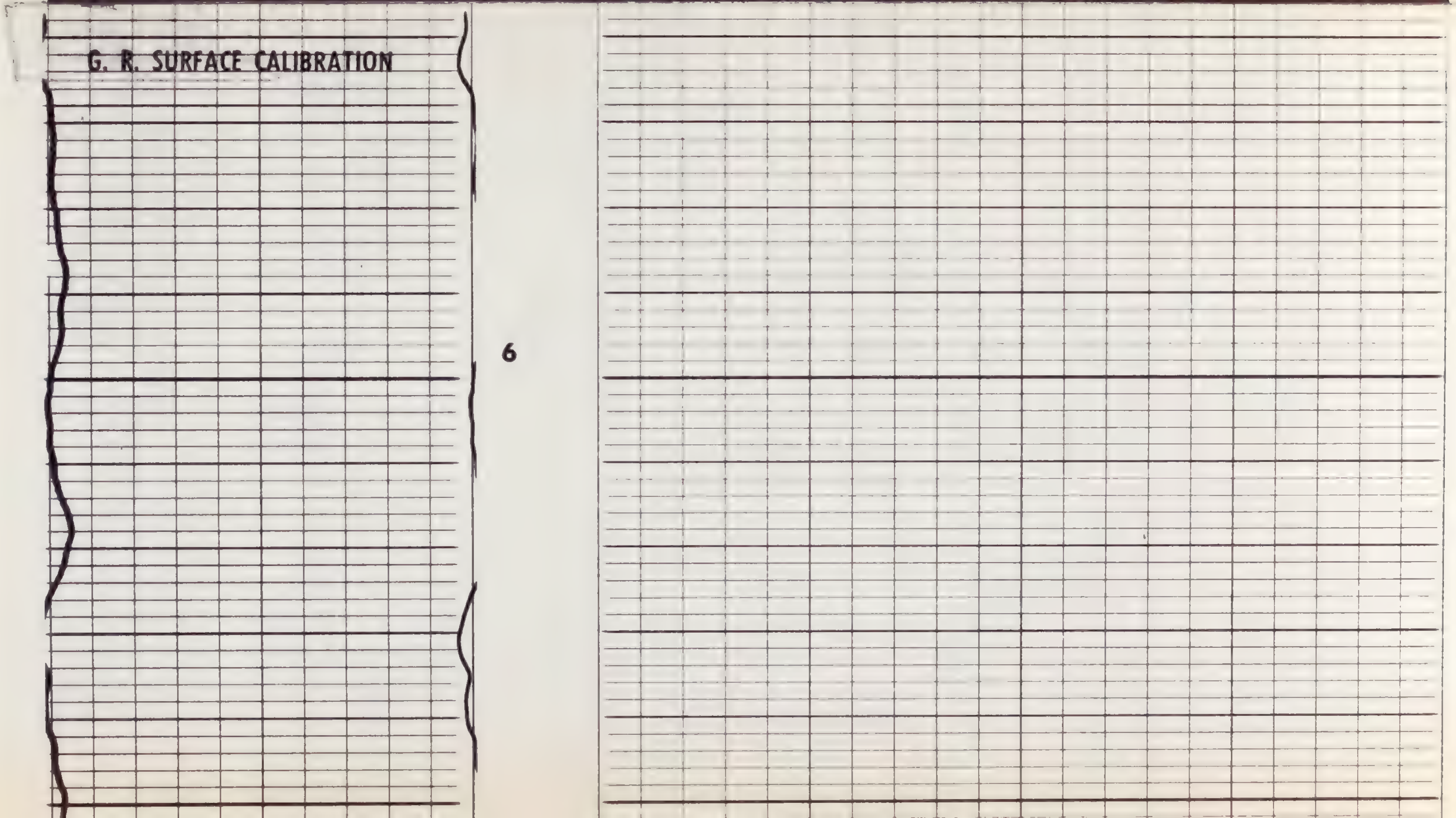
WELL SORGHUM GULCH NO. 17 Rm @ BHT F

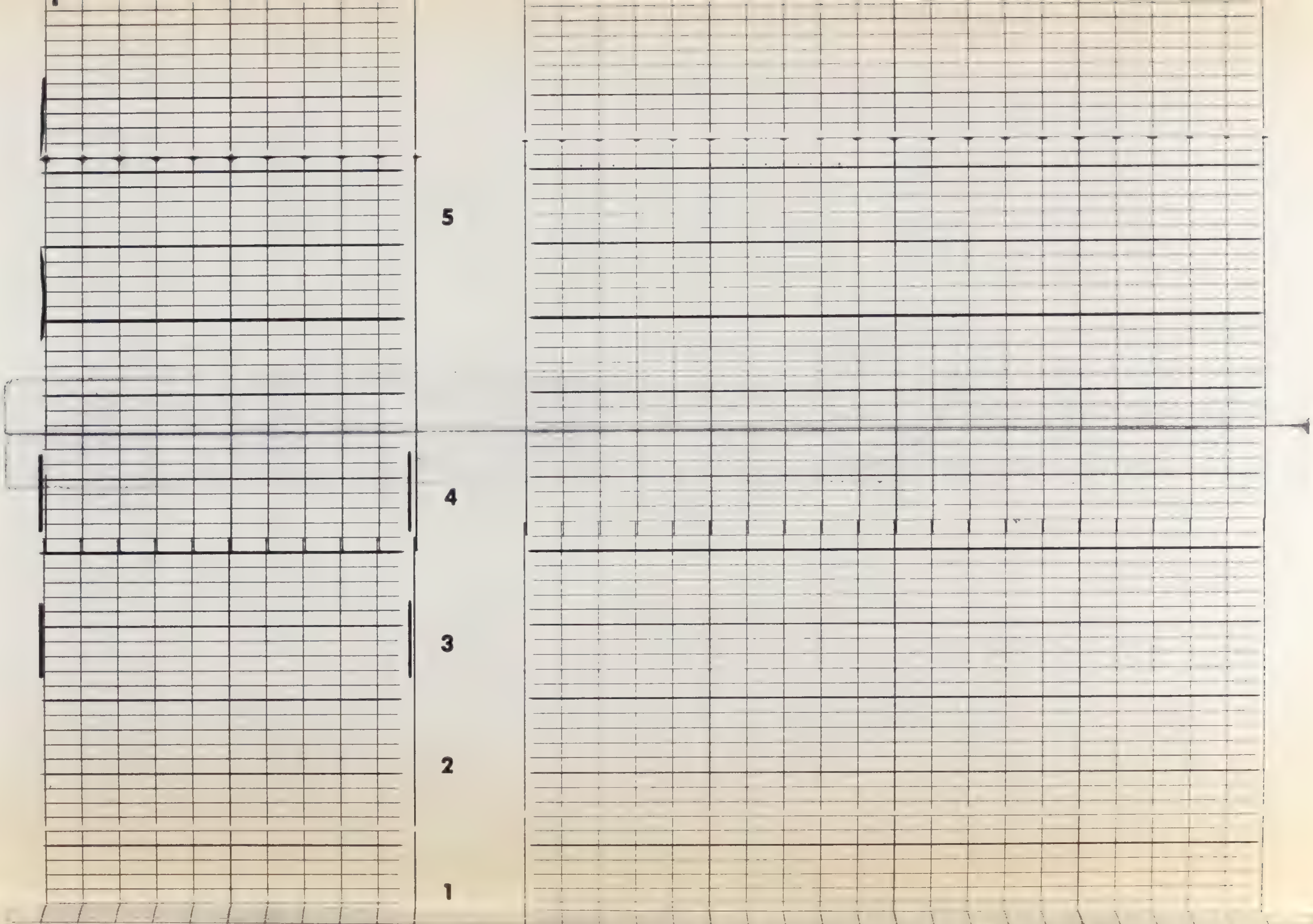
FIELD SORGHUM GULCH F

COUNTY RIO BLANCO STATE COLORADO

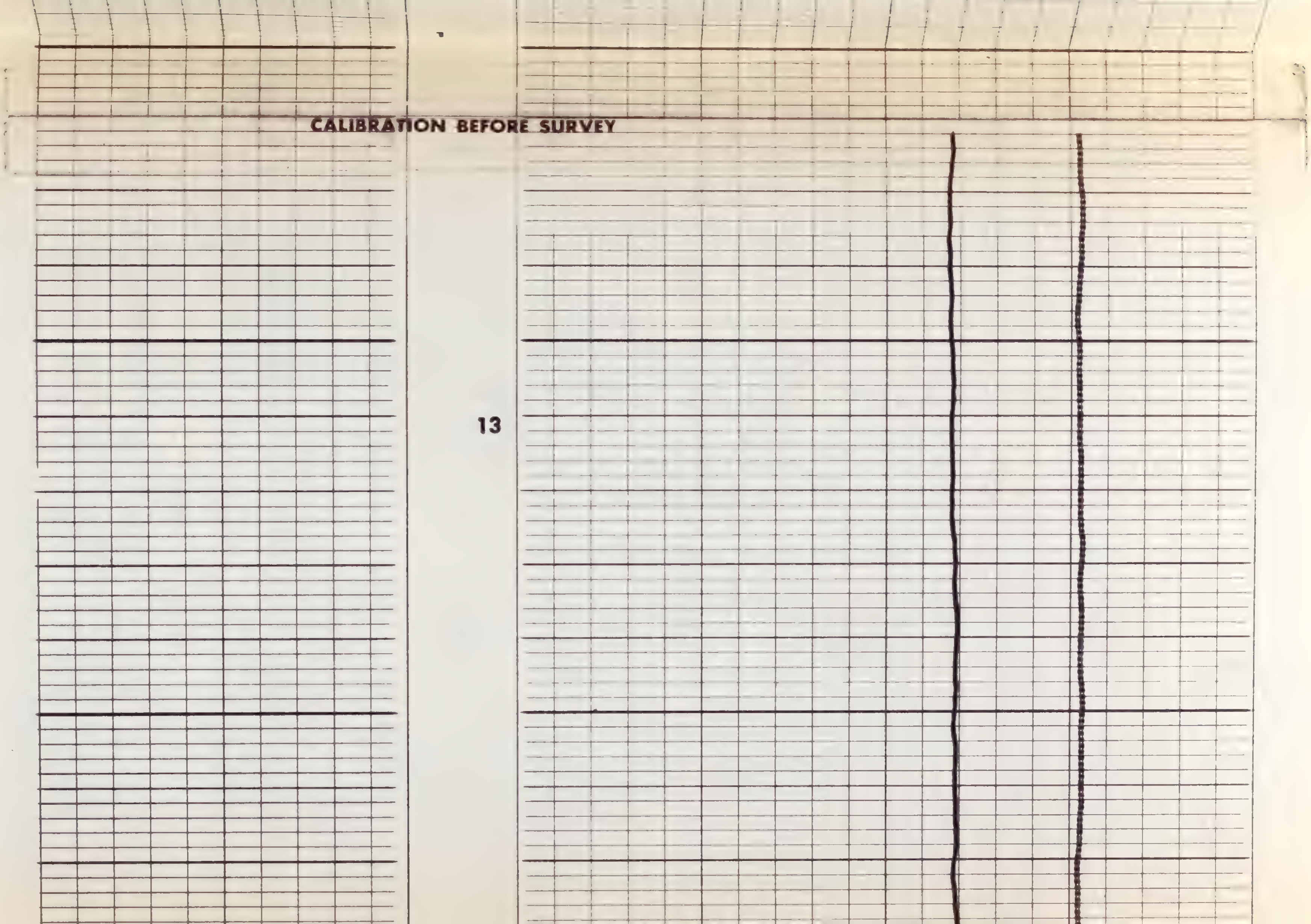
SCHL. FR 2434
SCHL. TD 2435
DRLR TD 2436
Elev: KB 7044
DF 7043
GL 7036

CALIBRATION RECORD

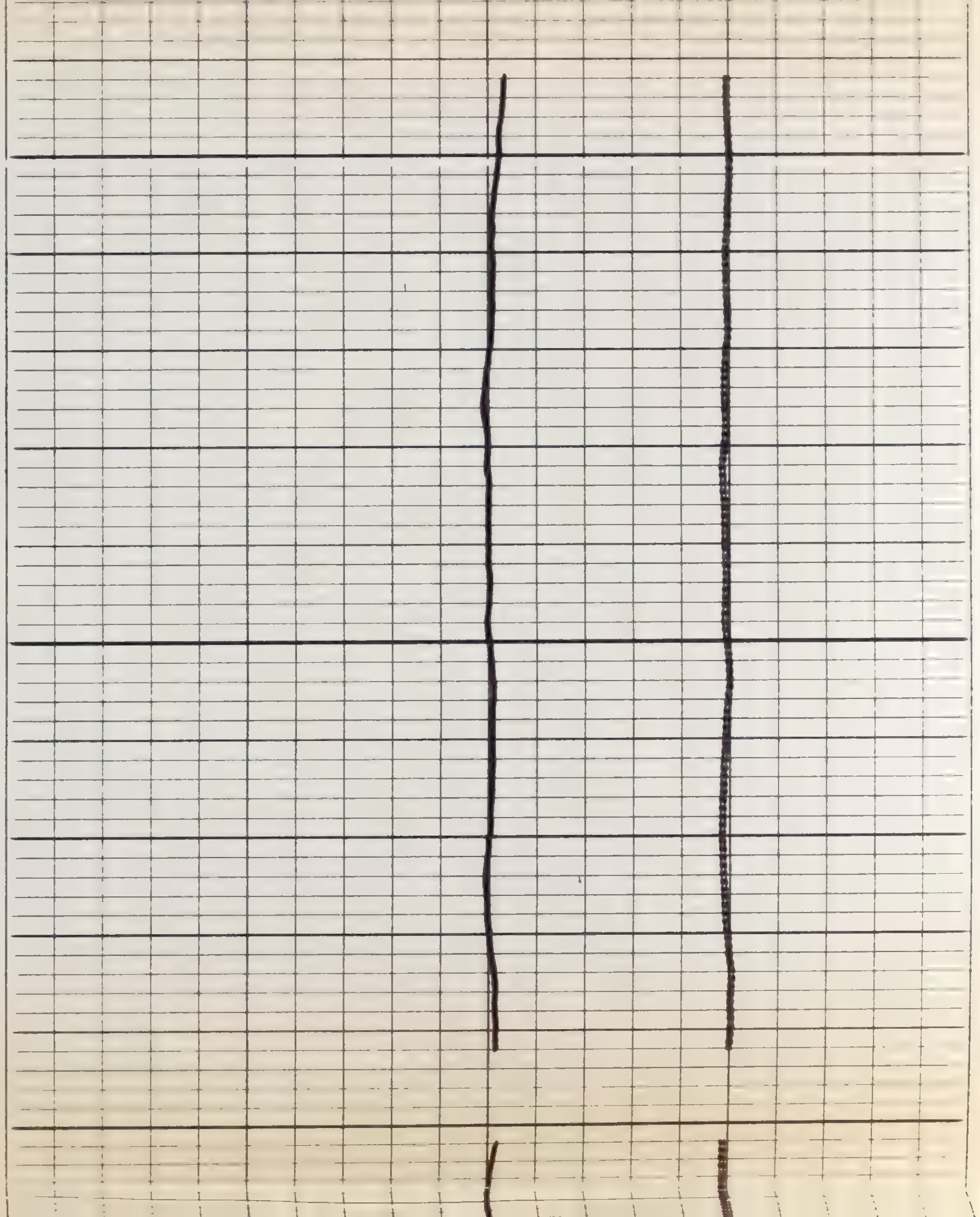


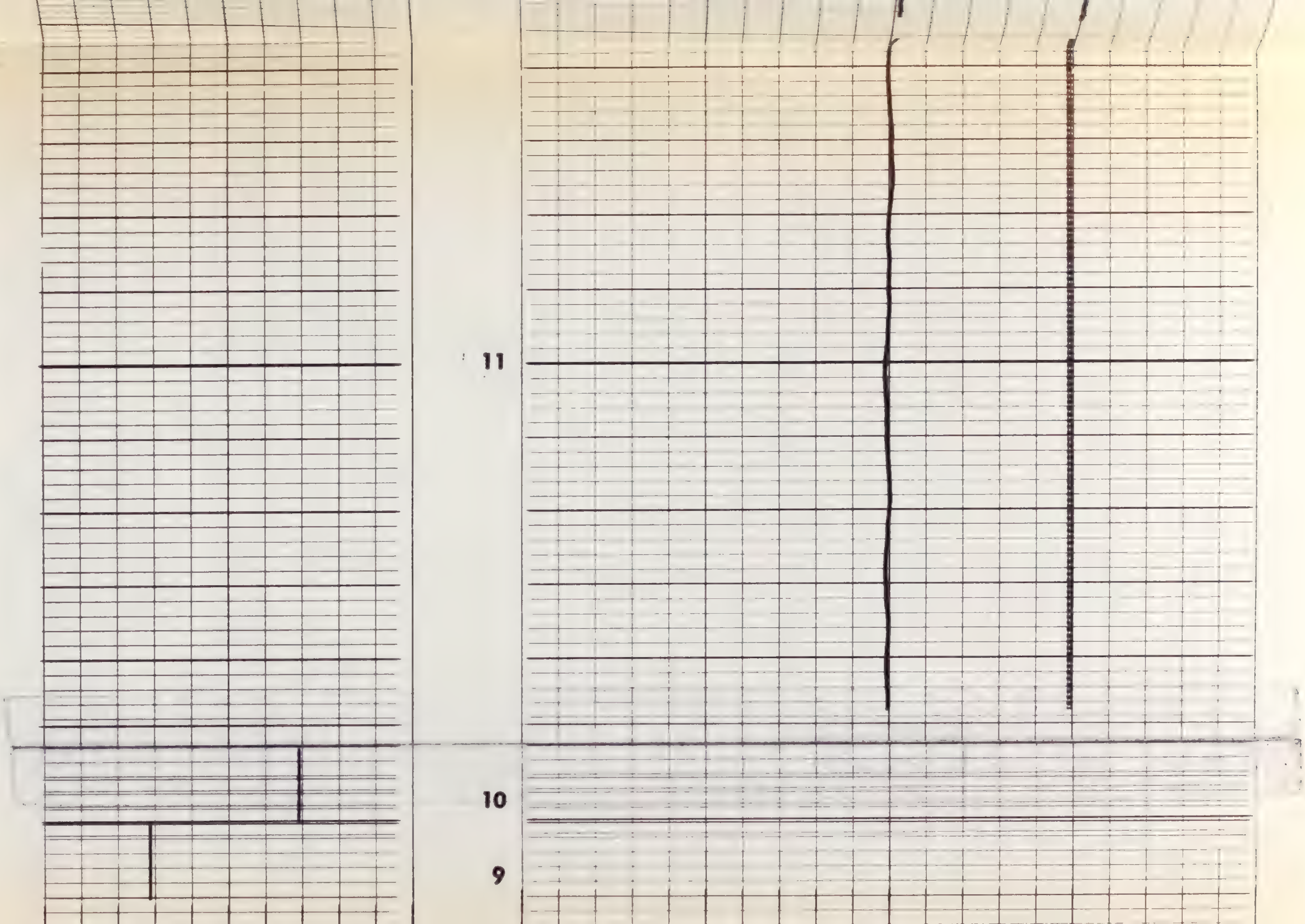


CALIBRATION BEFORE SURVEY


CALIBRATION BEFORE SURVEY
13

12

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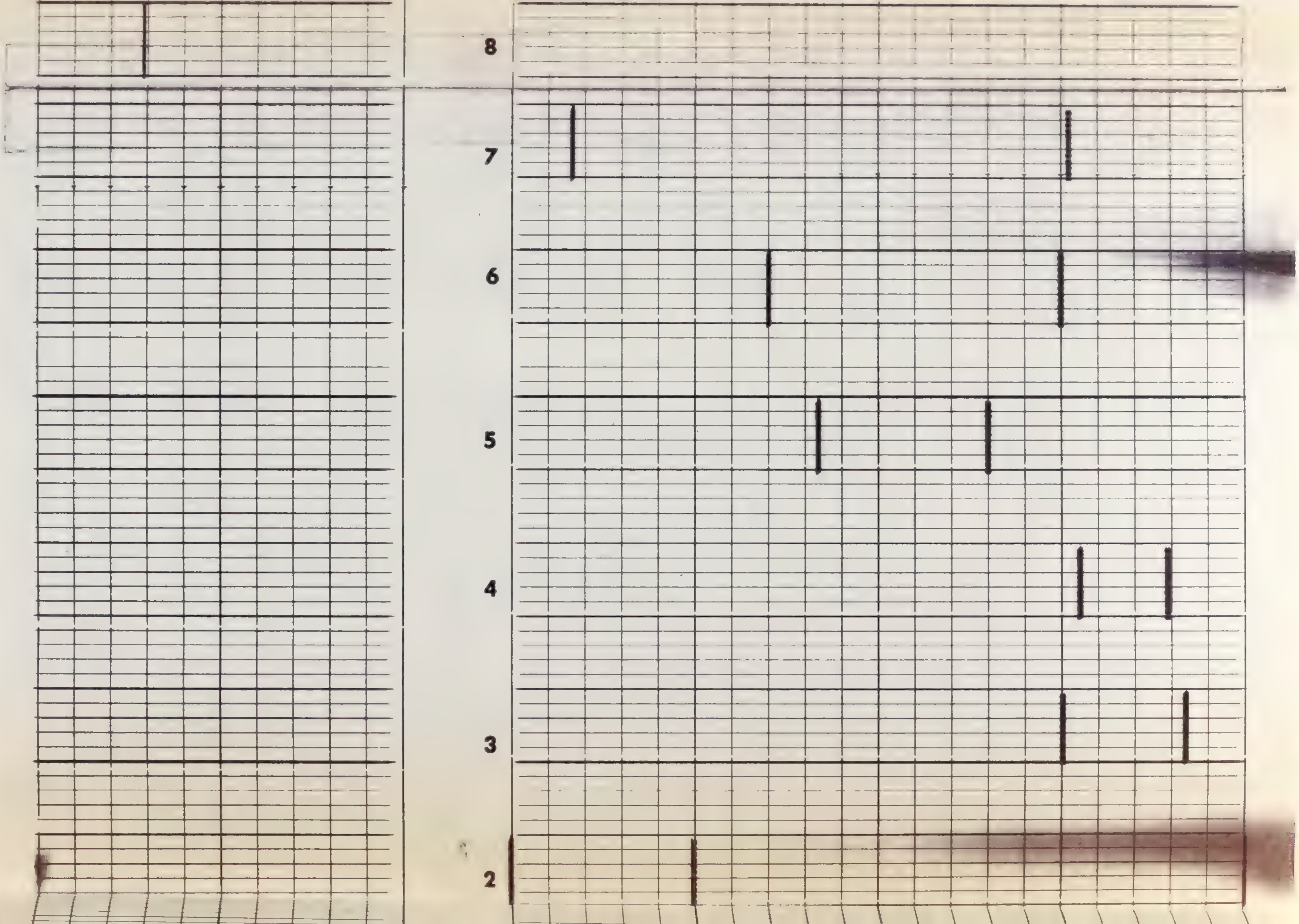
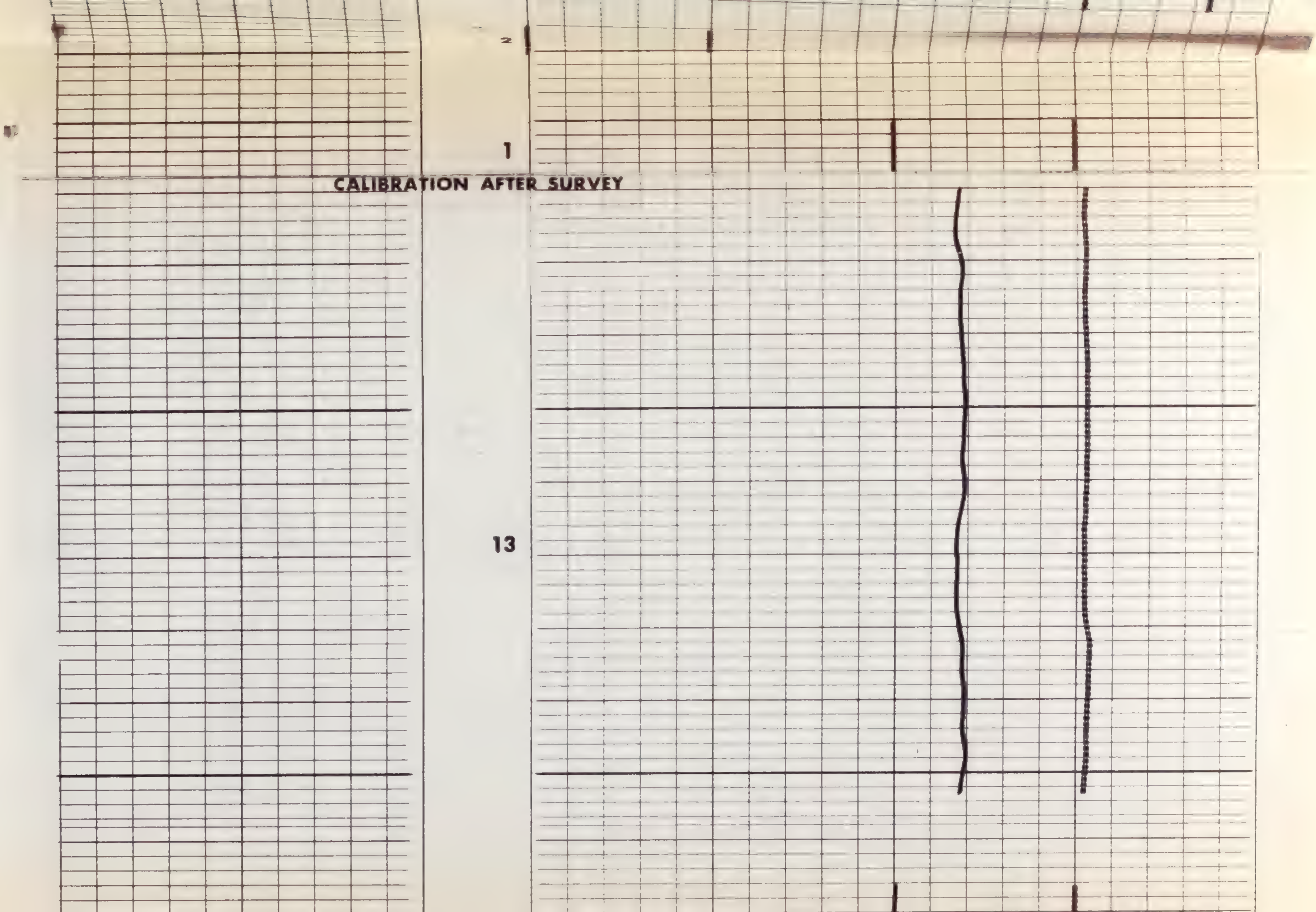
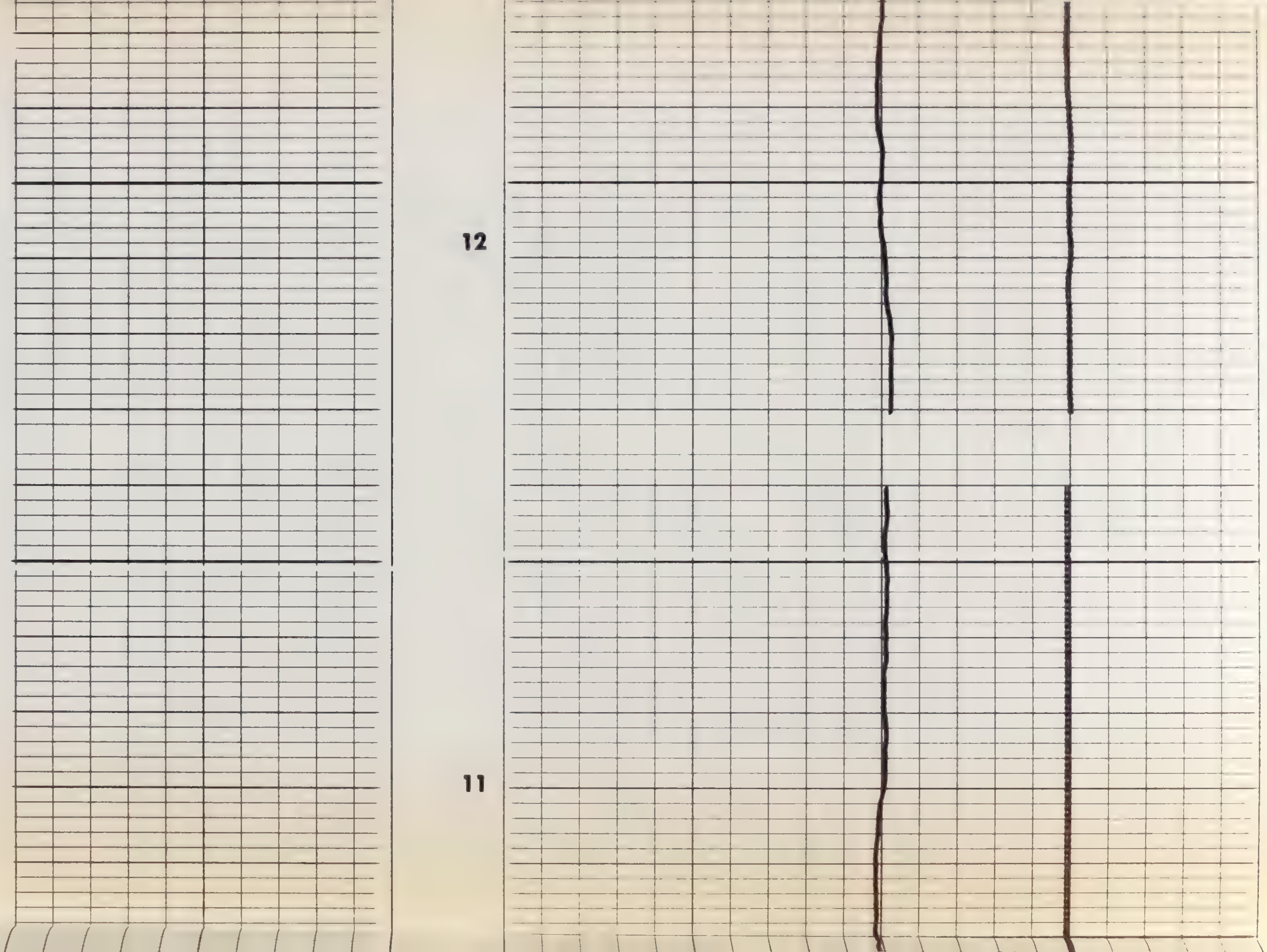
10
9



8
7
6
5
4
3
2


2
1
CALIBRATION AFTER SURVEY
13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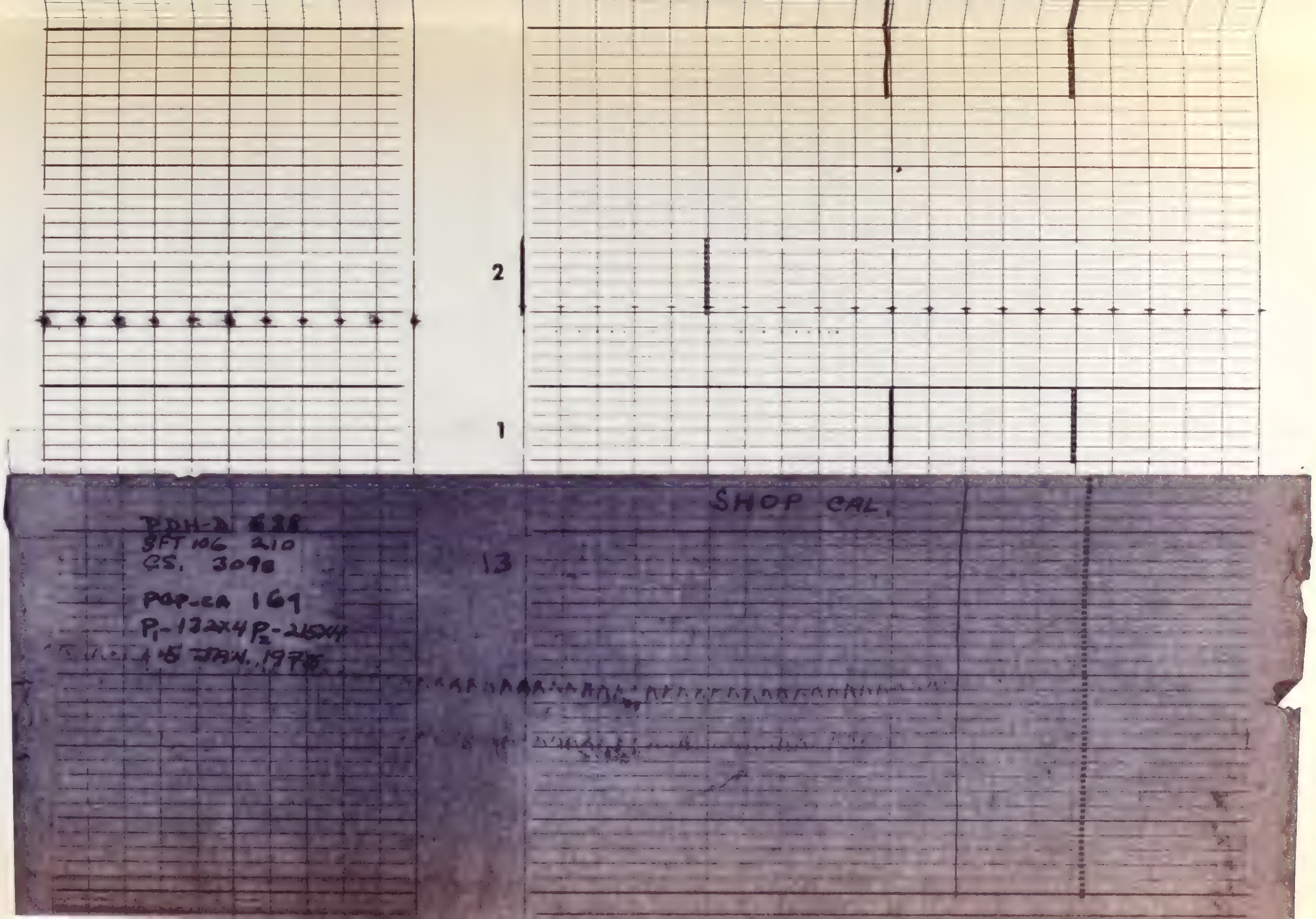
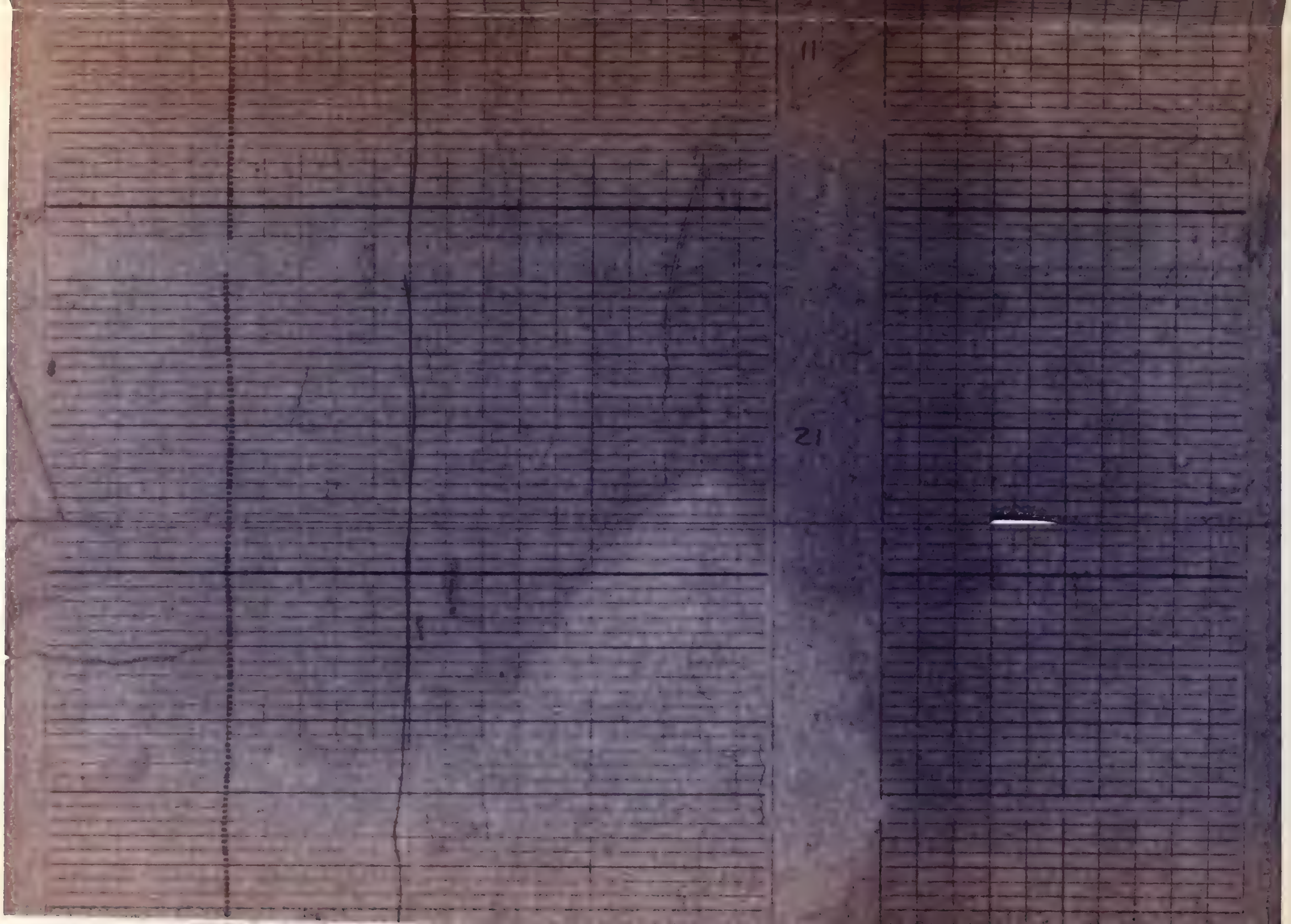

2
1
SHOP CAL.
PDH-D 638
SFT 106 210
CS. 3098
POP-CA 169
P_1-132X4 P_2-215X4
15 JAN. 1975
13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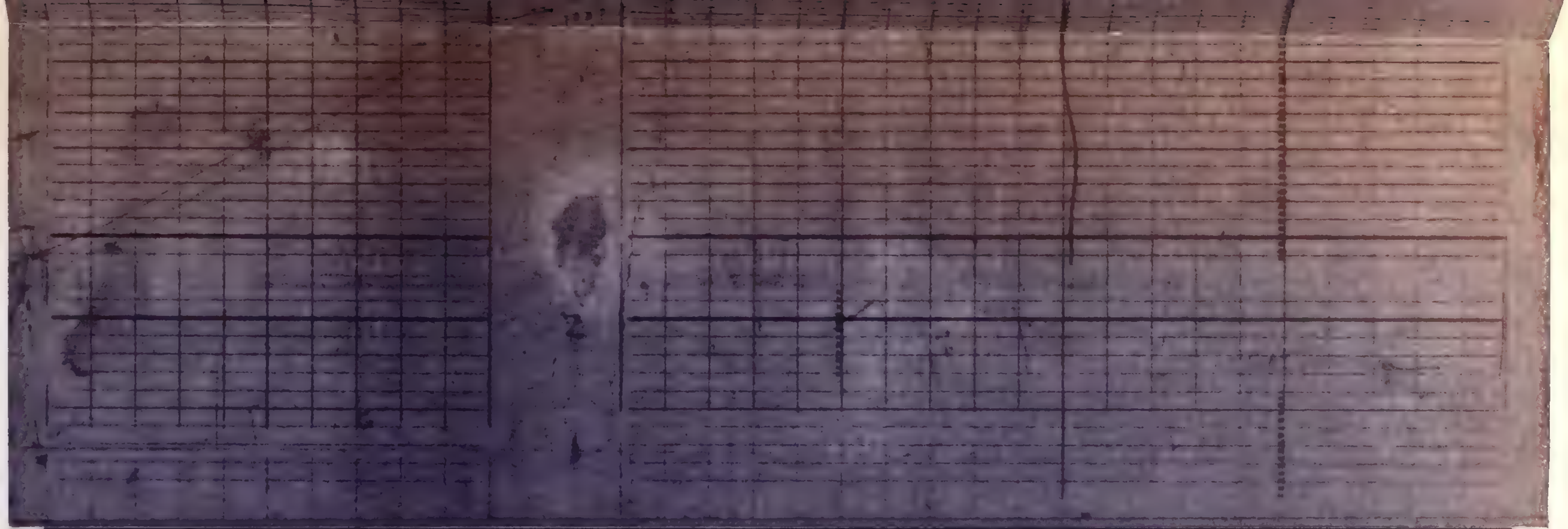
21



FORMATION DENSITY COMPENSATED CALIBRATION CODING

1. MECHANICAL ZERO
2. RECORDER SENSITIVITY

PANEL TEST

FDC LIQUID

	POS	ρ	$\Delta\rho$
3.	# 1	2.92	.00
4.	# 2	2.78	+.14
5.	# 3	2.42	−.10
6.	# 4	2.35	.00
7.	# 5	2.08	.01

8. MECHANICAL ZERO CALIPER
9. 8″ RING
10. 12″ RING
11. TOOL CALIBRATE # 1 SET $\rho = 2.50$
12. TOOL CALIBRATE # 2 SET $\Delta\rho = .00$
13. LOG POSITION $\rho = 2.59$, $\Delta\rho = .015$

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY
4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATE - SOURCE IN PLACE

↑

CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO.17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Rm ______ @ ______ °F

BHT ______ °F

SCHL. FR 2434
SCHL. TD 2435
DRLR TD 2436
Elev:
KB 7044
DF 7043
GL 7036

COUNTY RIO BLANCO
FIELD or

Schlumberger

DUAL LATEROLOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL SORGHUM GULCH #17
COMPANY ARCO

COMPANY ATLANTIC RICHFIELD CO.

WELL SORGHUM GULCH NO.17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION
436' FWL & 181' FSL

Sec. 16 Twp. 3S Rge. 96W

Other Services:
FDC-GR
BHC-GR-AMP-VDL
HRT

Permanent Datum: GL, Elev. 7036
Log Measured From GL 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 7044
D.F. 7043
G.L. 7036

Date	1/12/75			
Run No.	ONE			
Depth—Driller	2460			
Depth—Logger	2456			
Btm. Log Interval	2442			
Top Log Interval	462			
Casing—Driller	8 5/8 @ 56	@	@	@
Casing—Logger	60			
Bit Size	6 3/4			
Type Fluid in Hole	AIR MIST			
Dens. | Visc.				
pH | Fluid Loss	ml	ml	ml	ml
Source of Sample	AIR DRILLED			
R_m @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
Source: R_{mf} R_{mc}				
R_m @ BHT	@ °F	@ °F	@ °F	@ °F
Time Since Circ.	14 HOURS			
Max. Rec. Temp.	115 °F	°F	°F	°F
Equip. | Location	5602 | 4111			
Recorded By	ETTER-WALKLEY			
Witnessed By	BURNS			

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.			
Depth - Driller				
Type Fluid in Hole	AIR MIST			
Dens.	Visc.			
ph	Fluid Loss	ml		ml
Source of Sample				
R_m @ Meas. Temp.		@ °F		@ °F
R_{mf} @ Meas. Temp.		@ °F		@ °F
R_{mc} @ Meas. Temp.		@ °F		@ °F
Source: R_{mf}	R_{mc}			
R_m @ BHT		@ °F		@ °F
R_{mf} @ BHT		@ °F		@ °F
R_{mc} @ BHT		@ °F		@ °F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Panel No.	892			
Cart. No.	857			
Sonde No.	748			
Mem. Panel No.				
G.R. Cart. No.				
G.R. Panel No.				
TTR No.				
Speed-F.P.M.	4000			
CENT. DEVICE-	NONE	SEE REMARKS		
STAND OFF-	NONE			
PANEL	850			

REMARKS

Service Order No. - 22470

API Serial No. -

NOTE: CENTERING DEVICES WERE NOT
USED IN AN EFFORT TO REACH BOTTOM.
FDC DID NOT REACH TD, HRT DID.

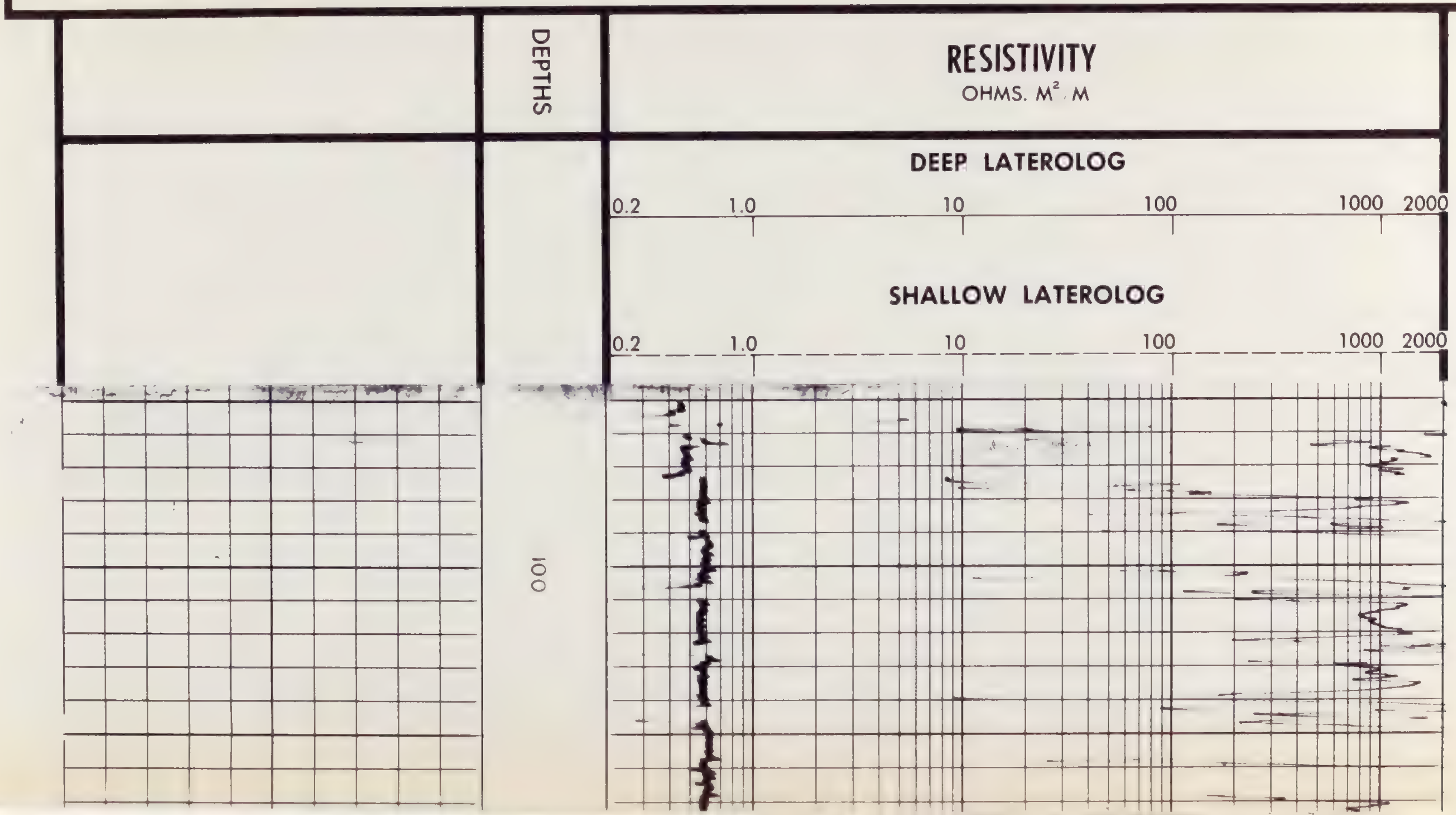
NOTE: COULD NOT GET SP TO WORK
WITH THIS EQUIPMENT.

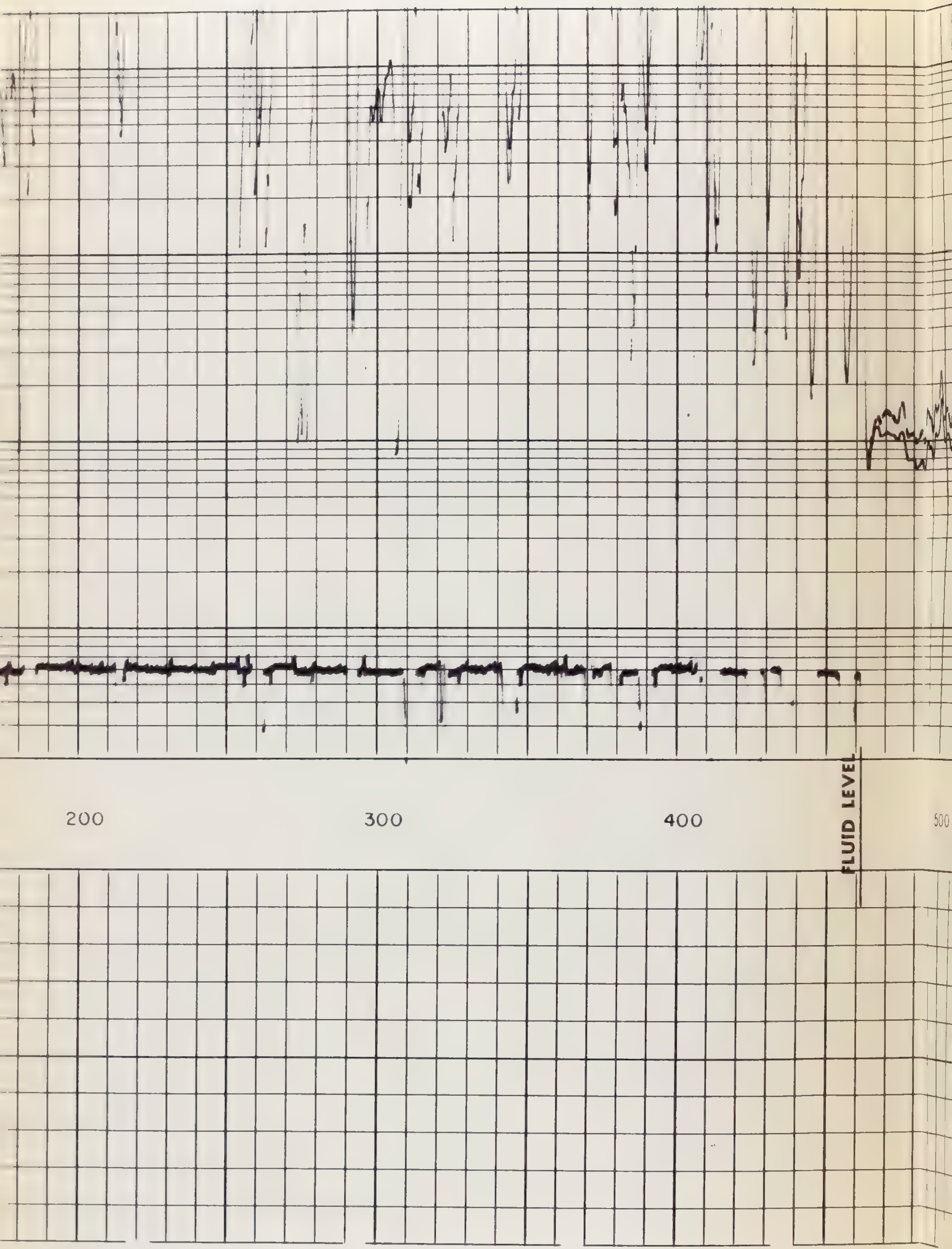
CALIBRATION DATA

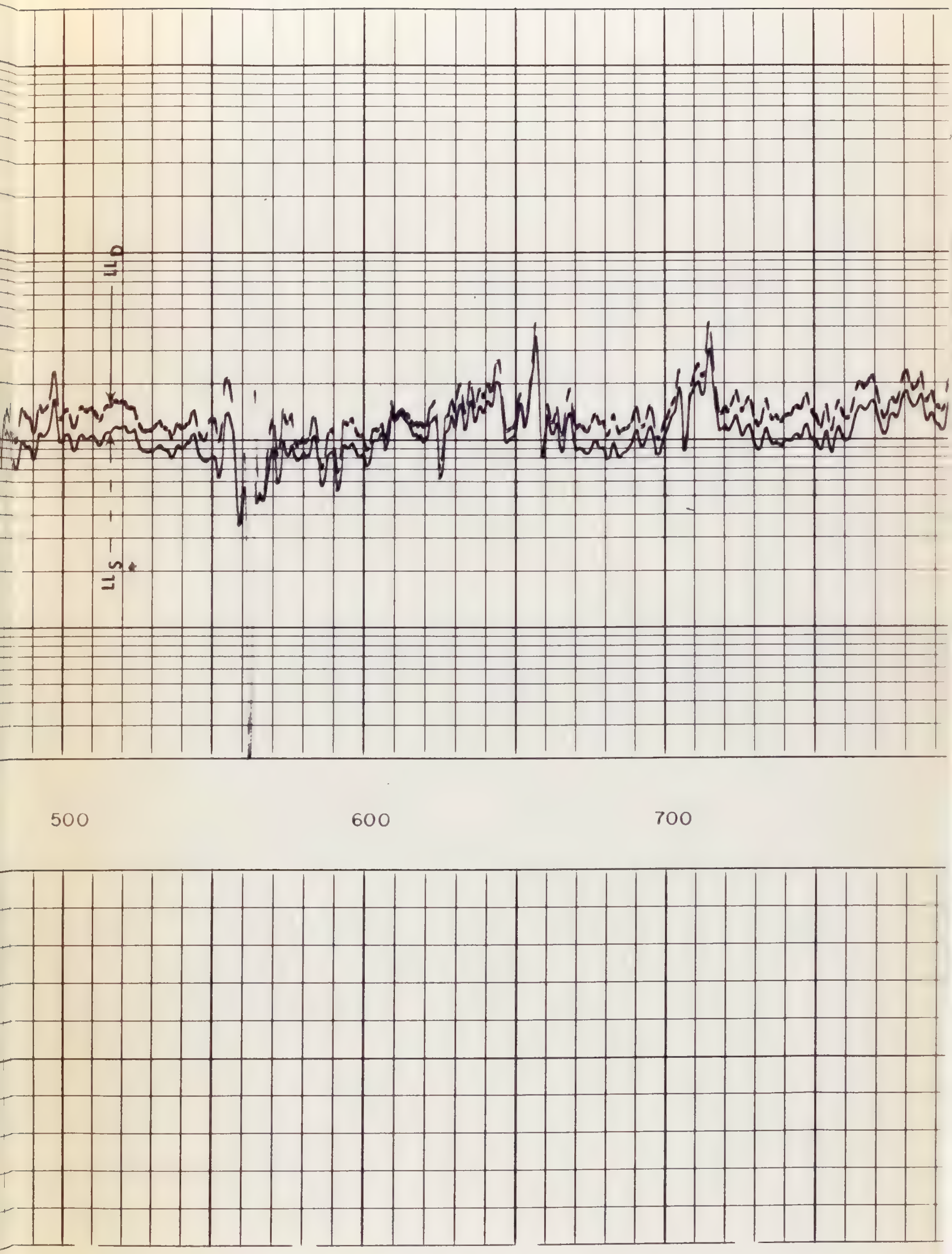
CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.
GAMMA RAY:						

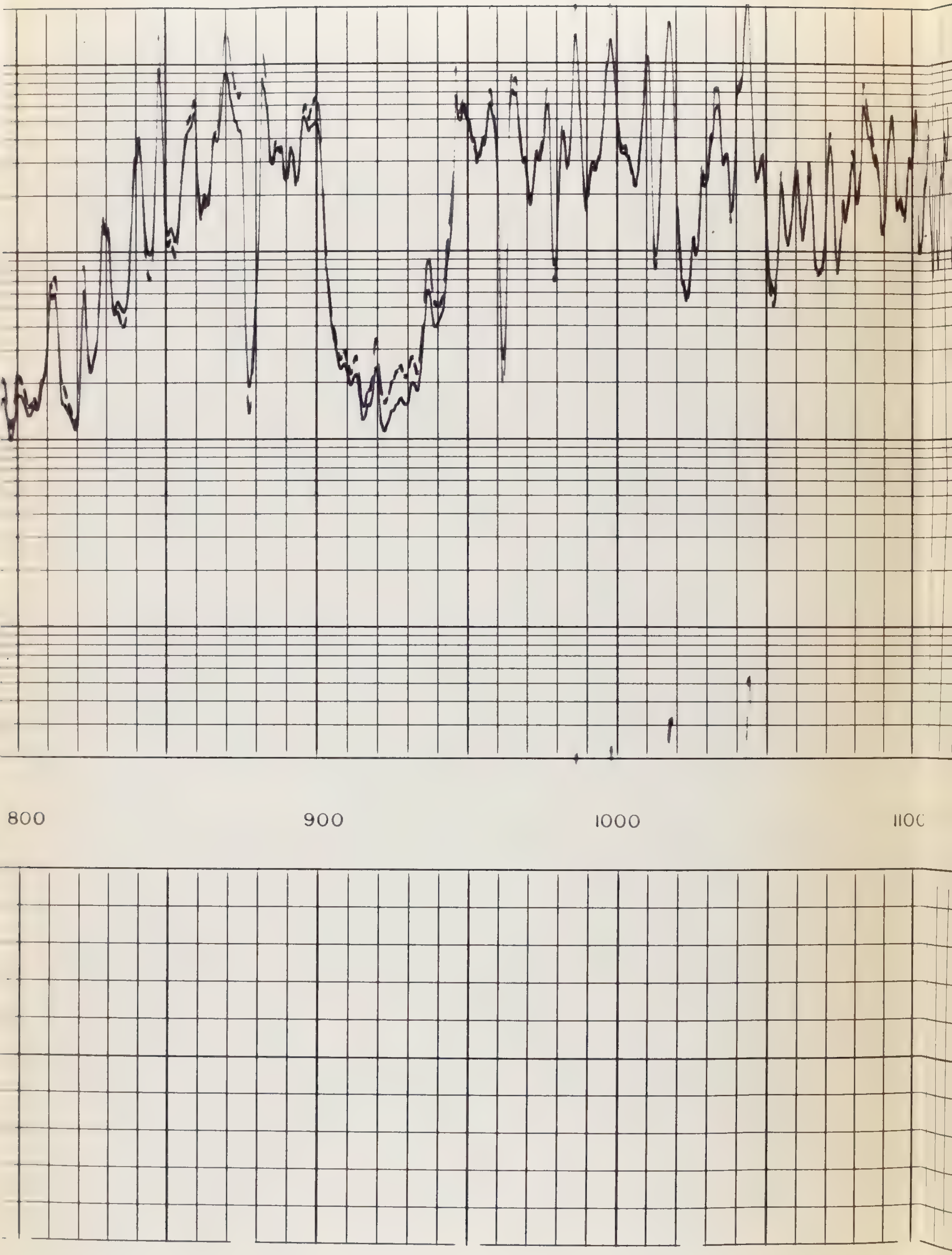
CALIBRATION DATA CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.	
GAMMA RAY:							

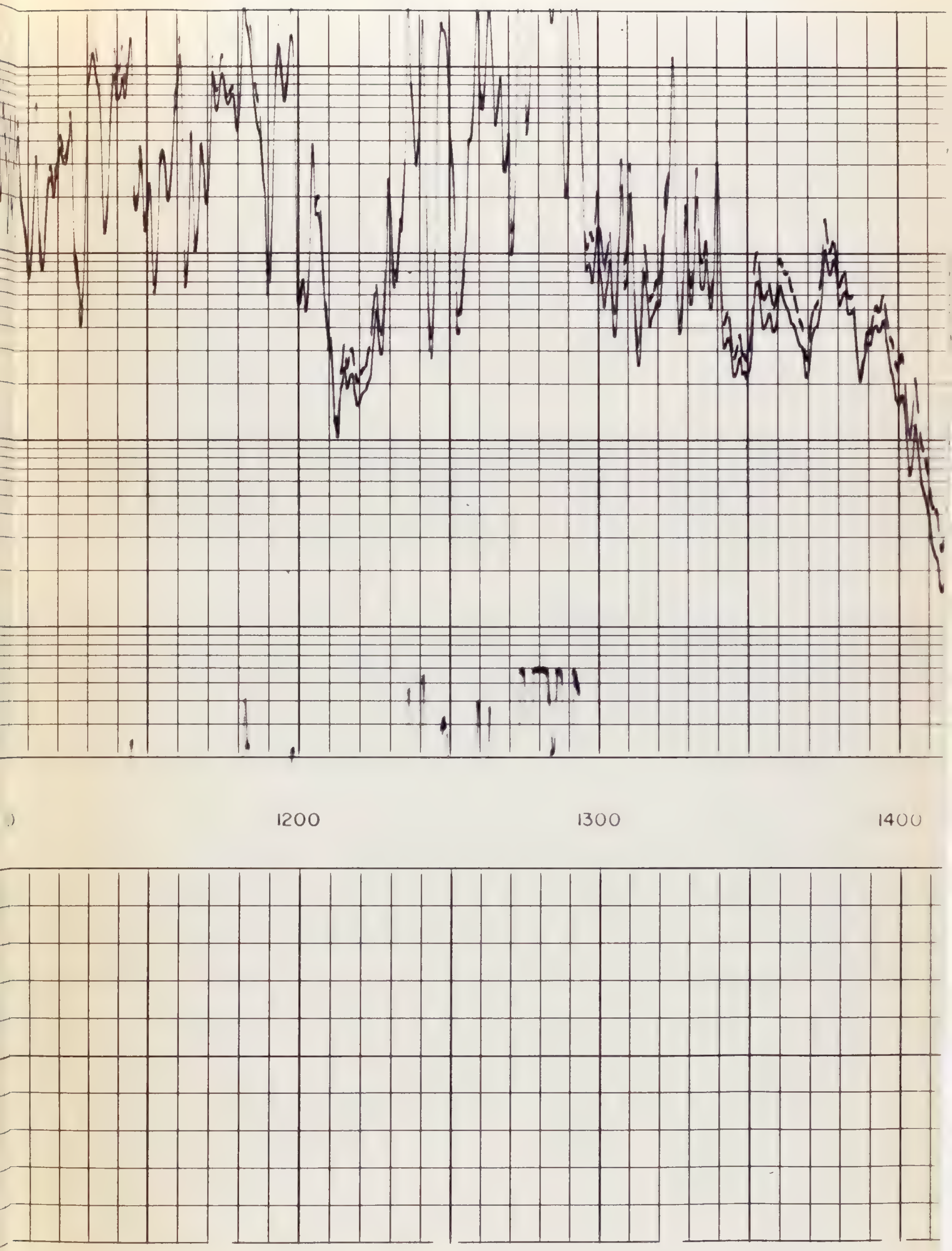
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.




200
300
400
FLUID LEVEL
500


LLD
LLS
500
600
700


800
900
1000
110C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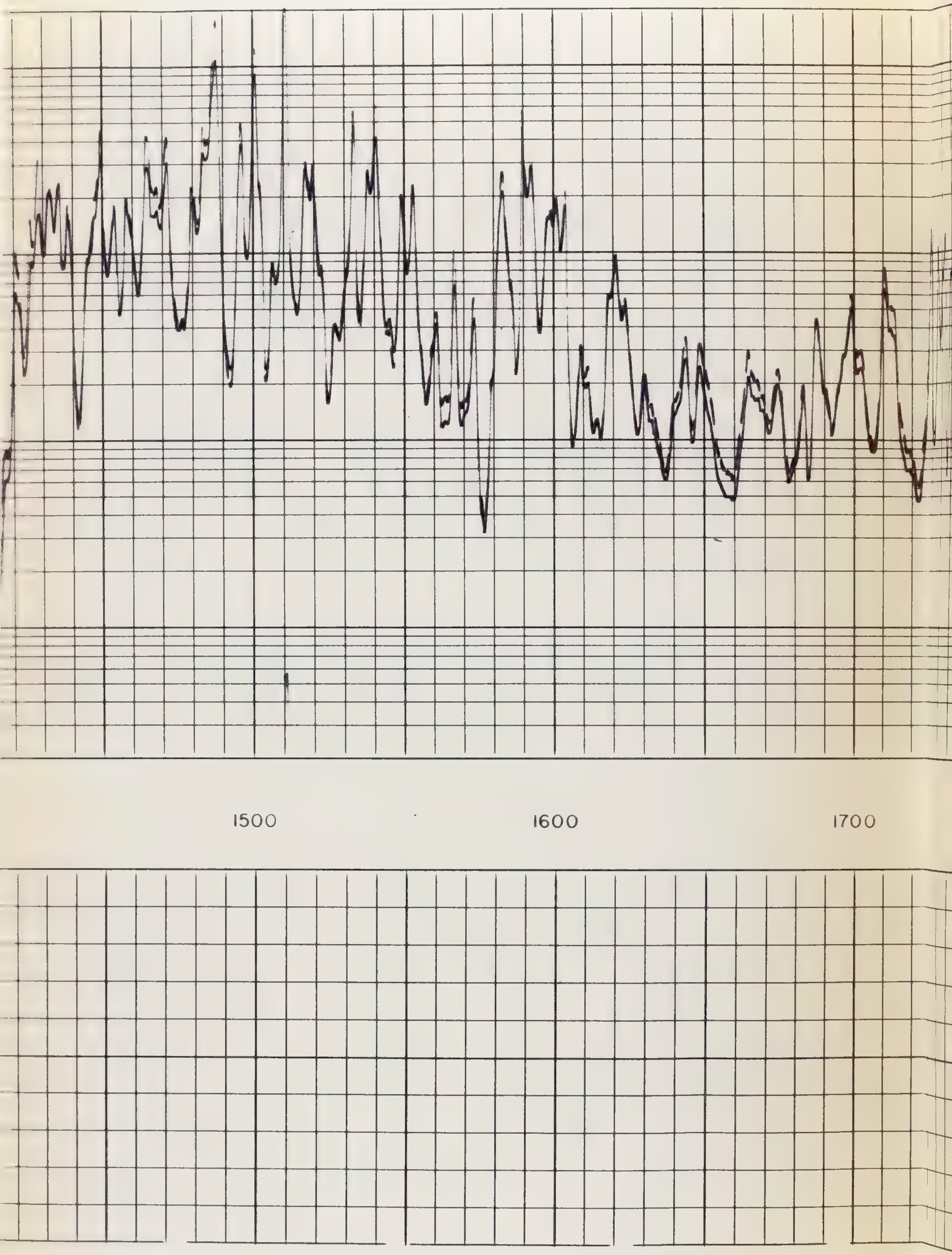
1300
1400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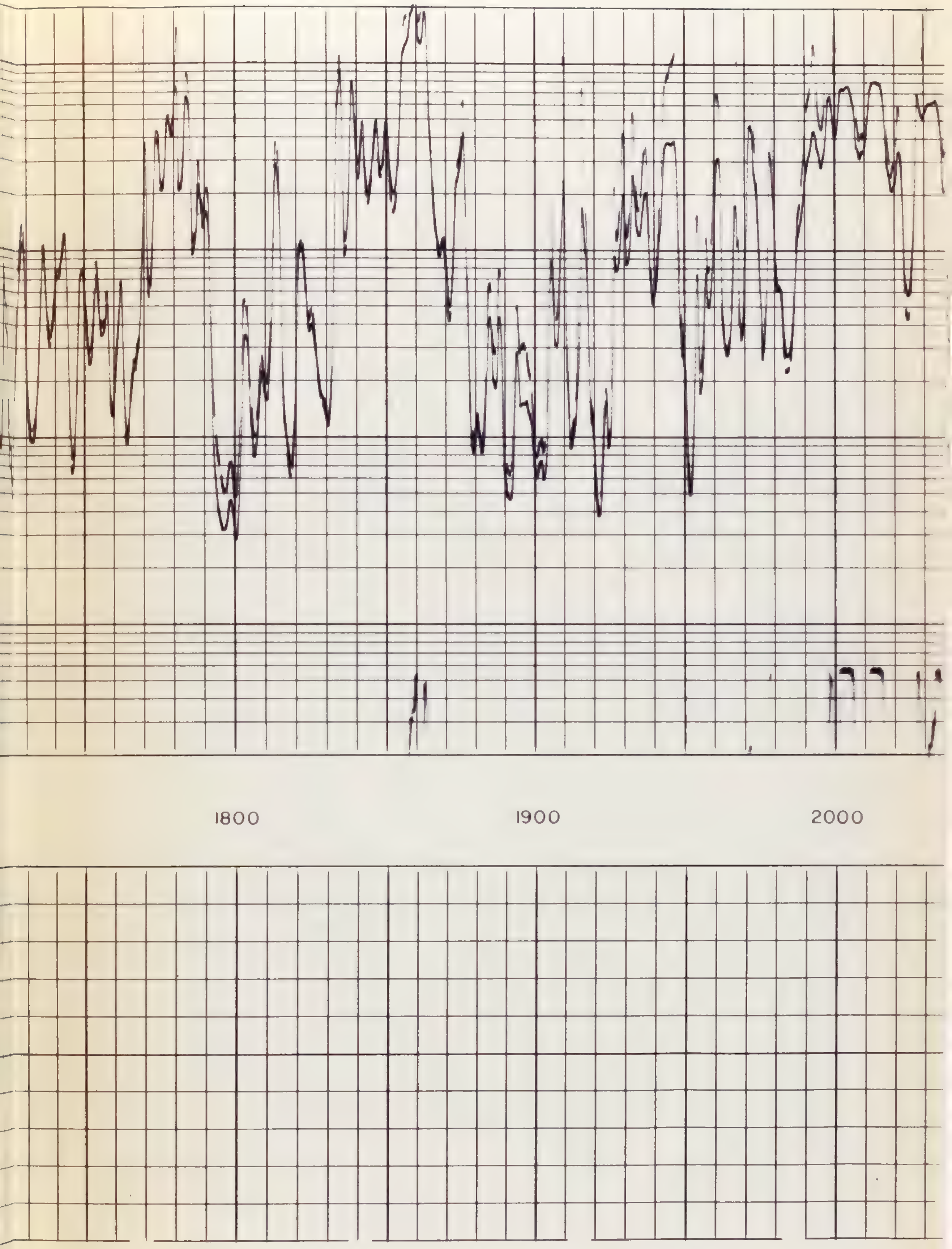
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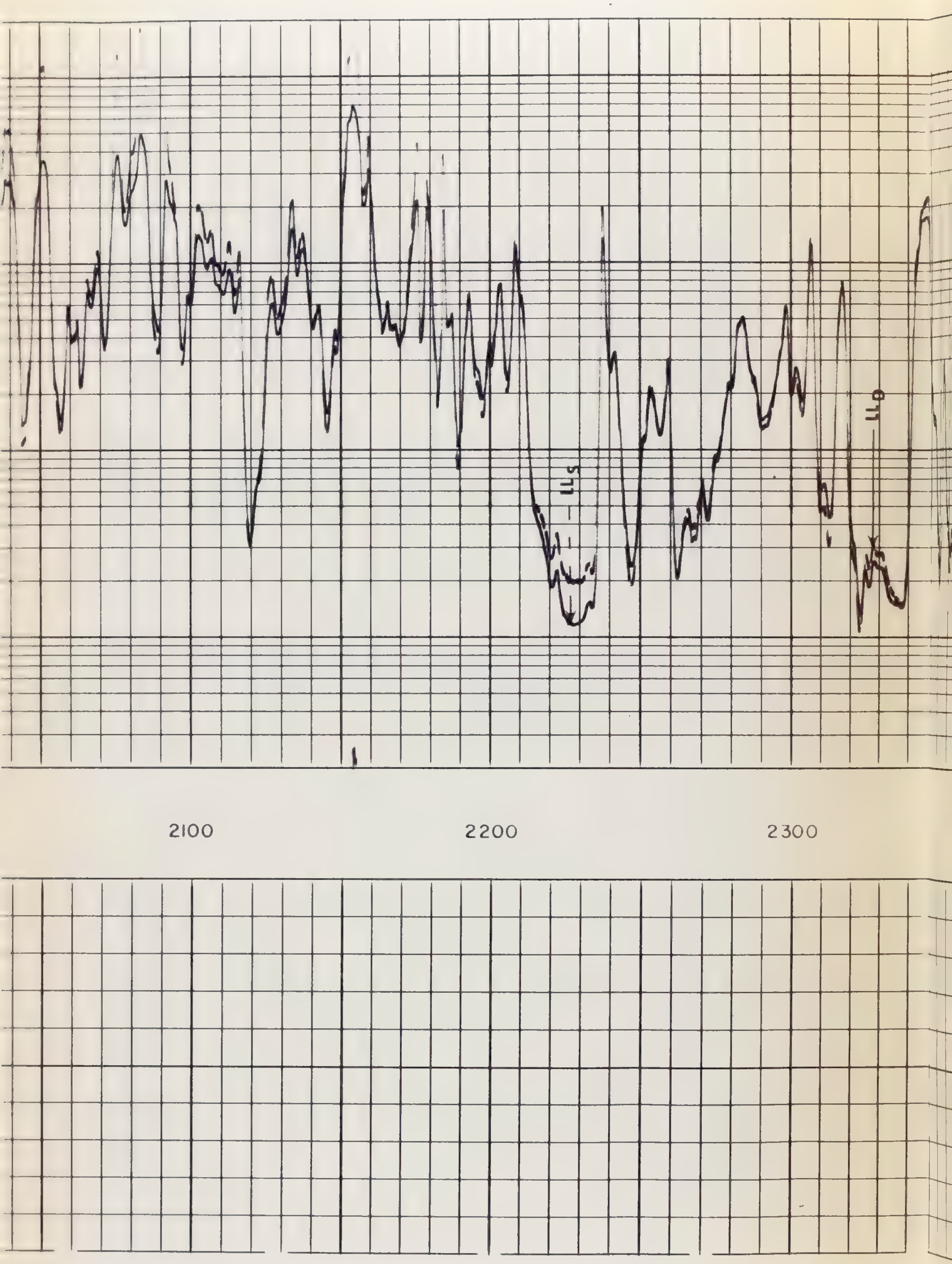
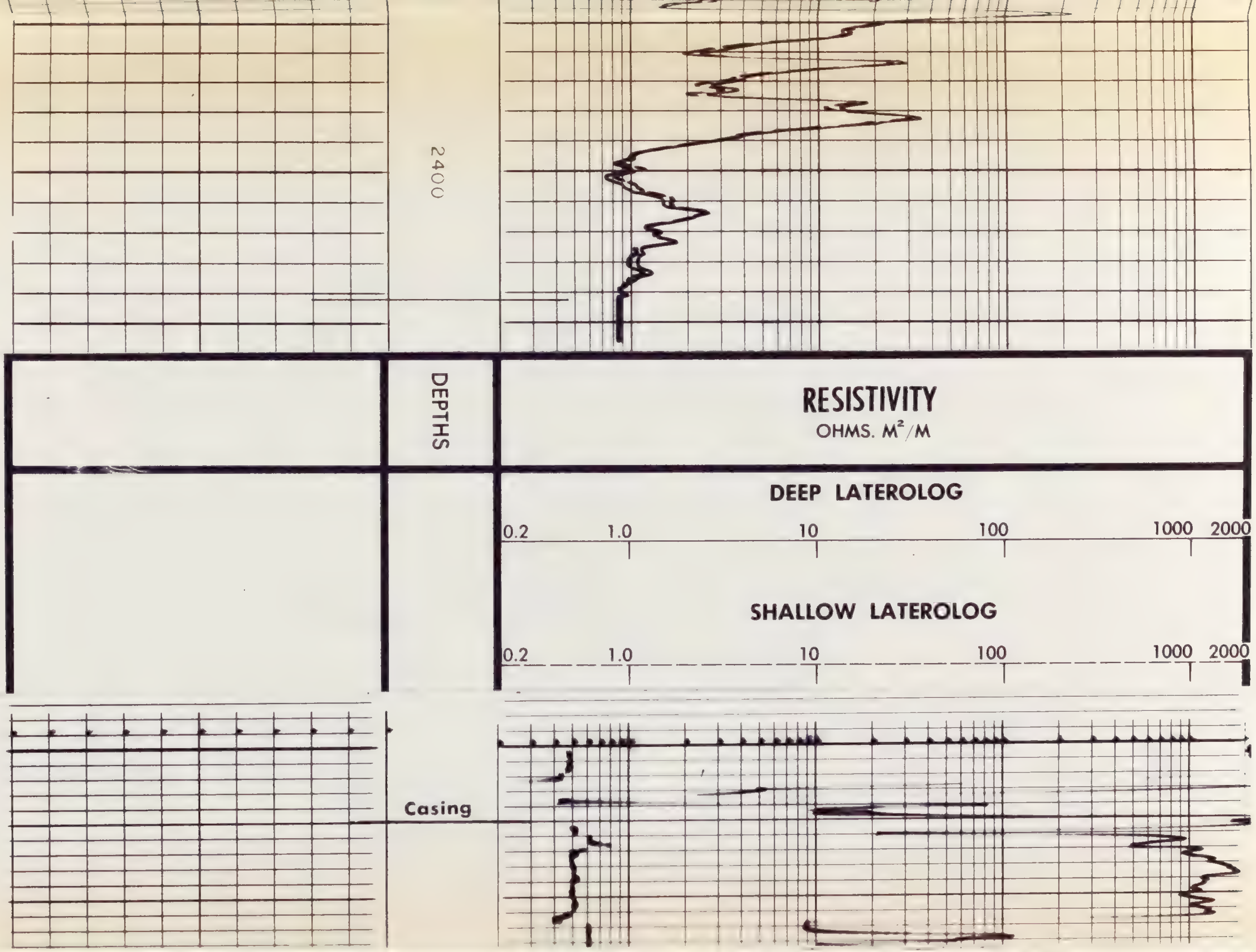
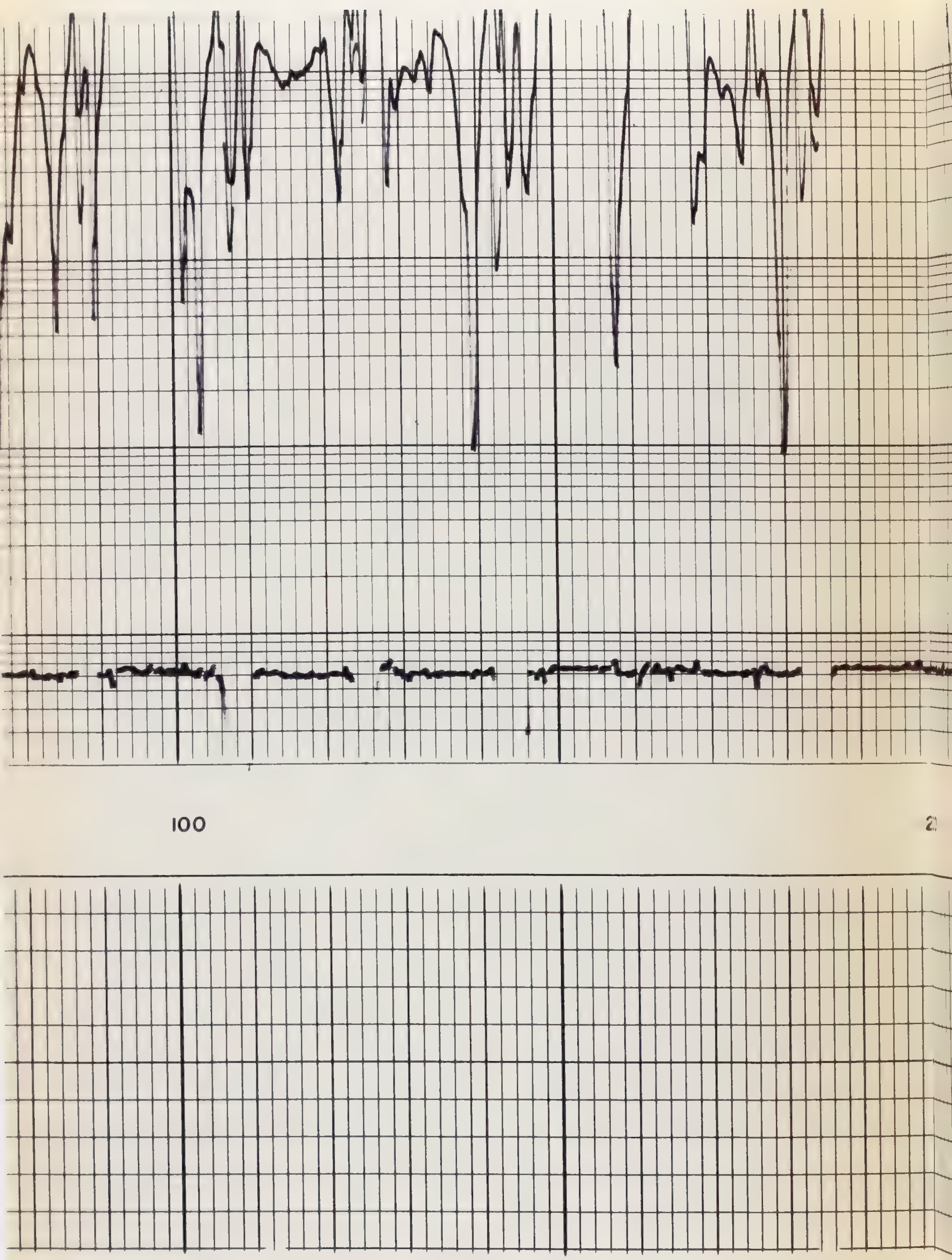
1900
2000


LLs
LLo
2100
2200
2300


2400
DEPTHS
RESISTIVITY
OHMS. M²/M
DEEP LATEROLOG
0.2
1.0
10
100
1000
2000
SHALLOW LATEROLOG
0.2
1.0
10
100
1000
2000
Casing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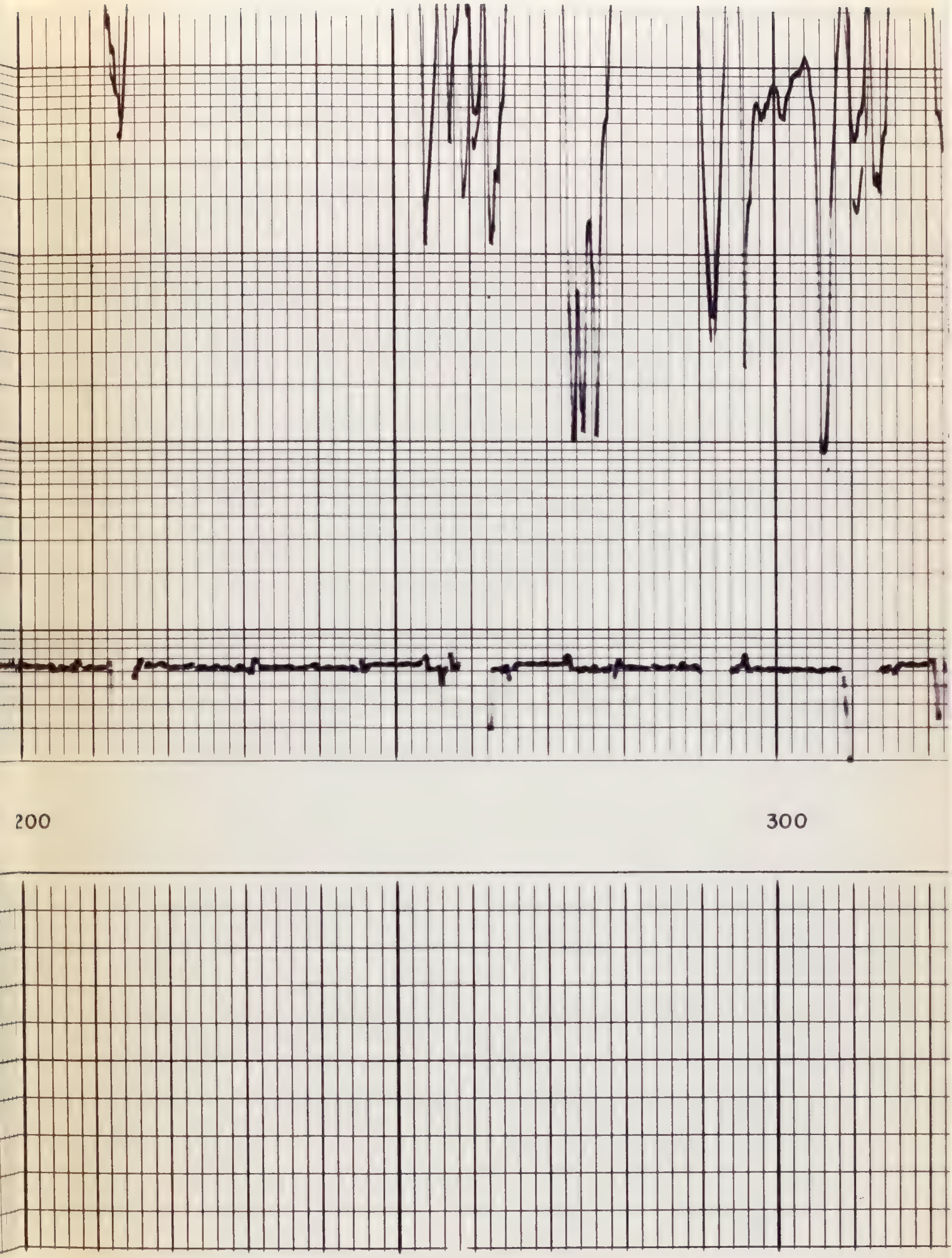
200
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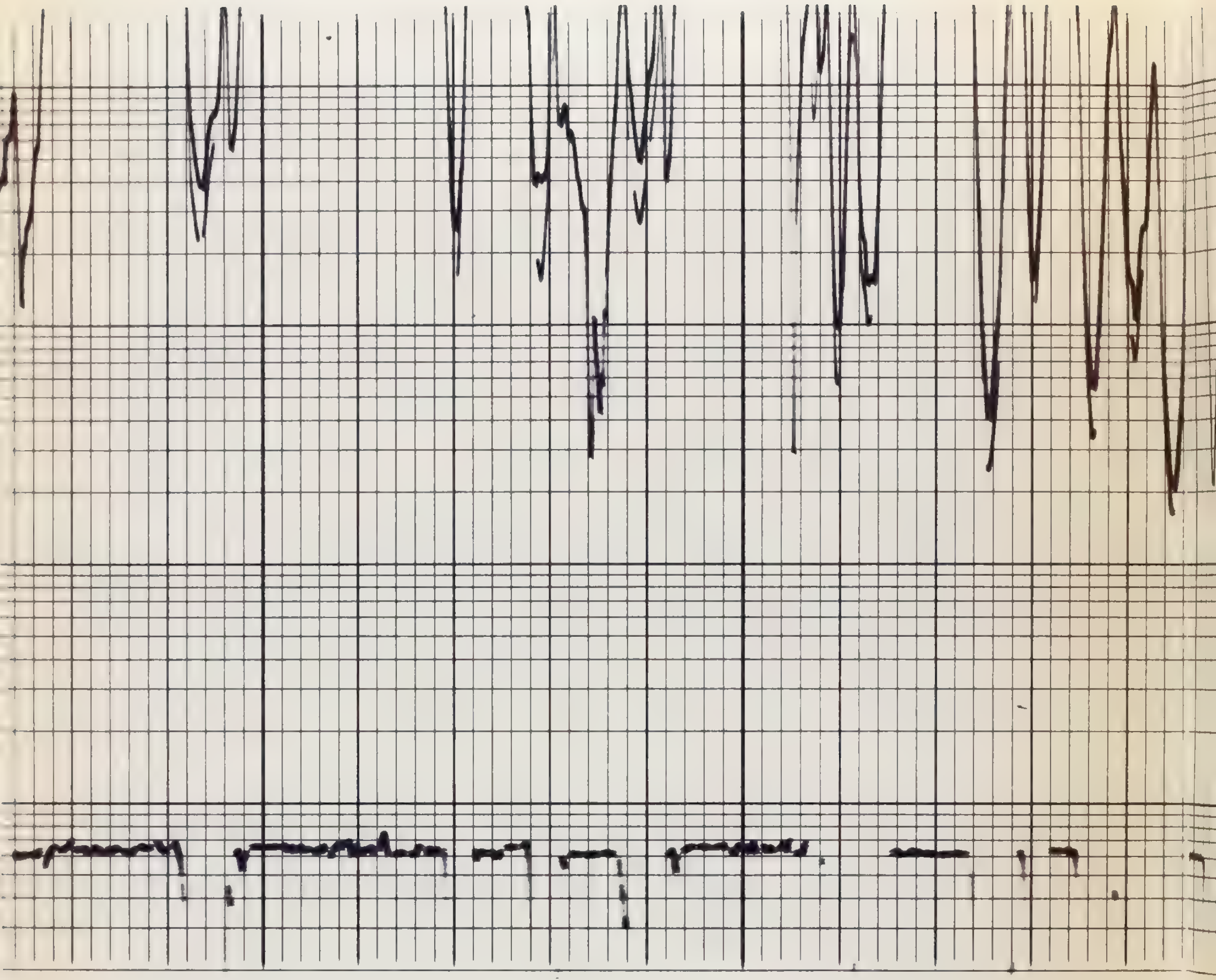

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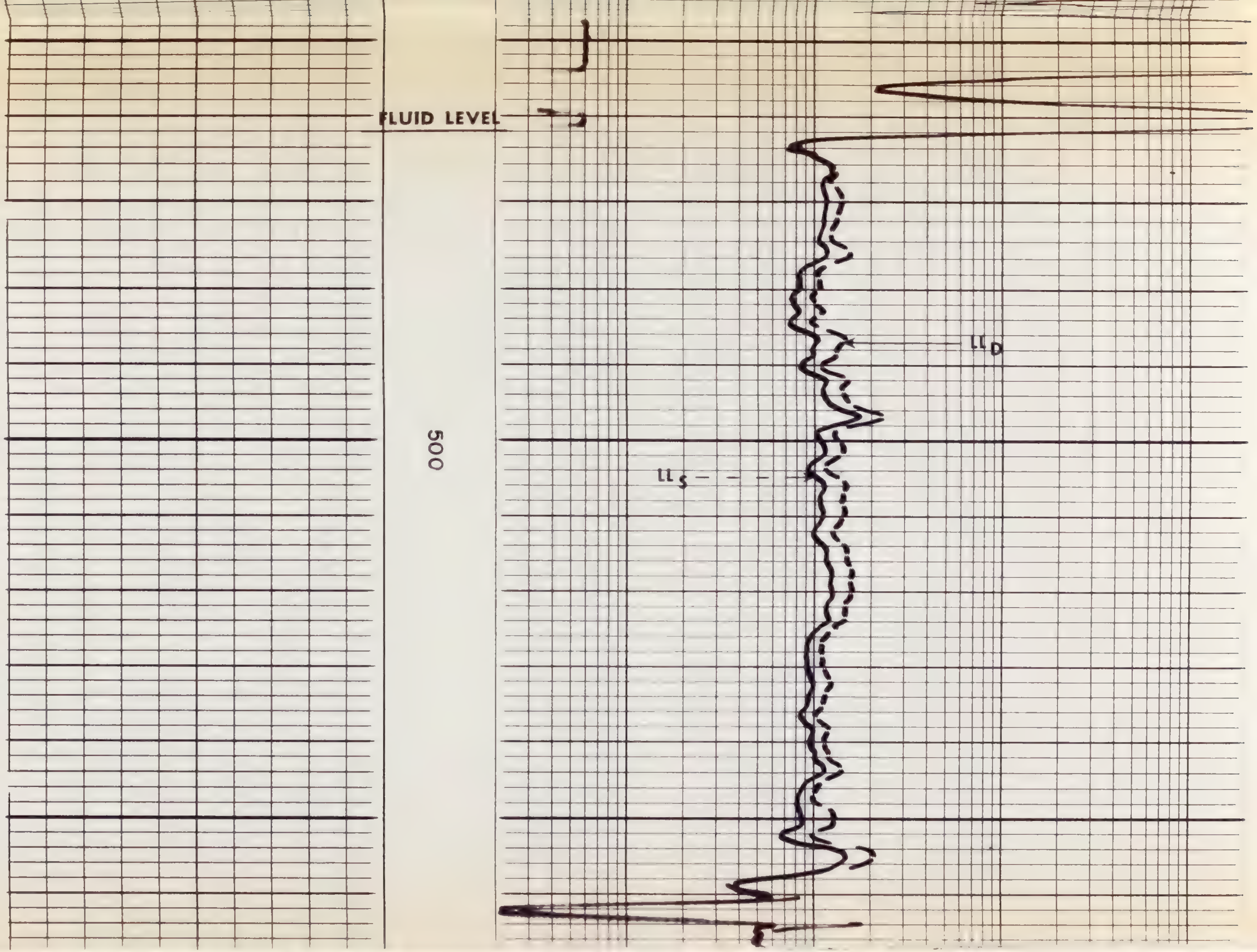
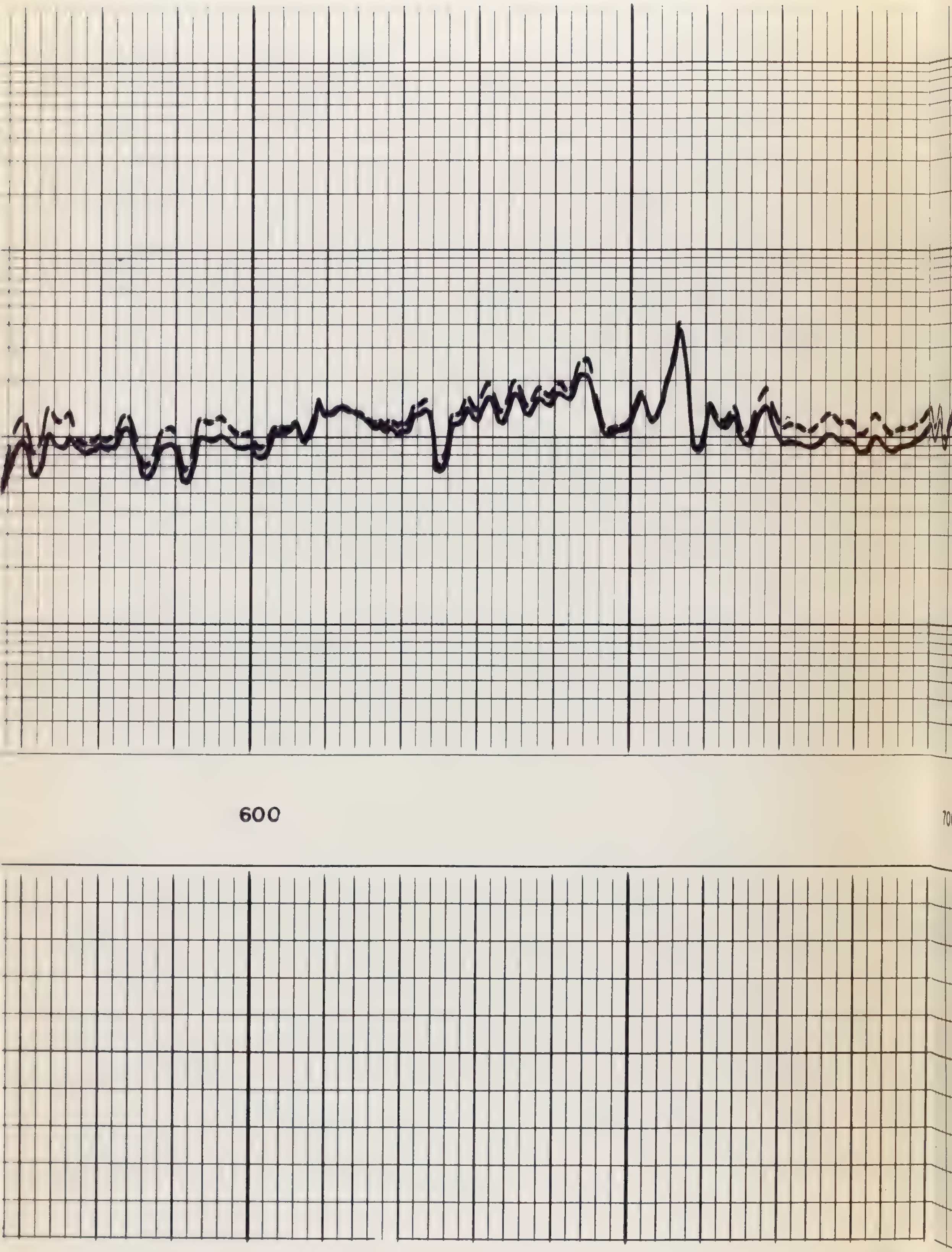

FLUID LEVEL
LLD
LLS
500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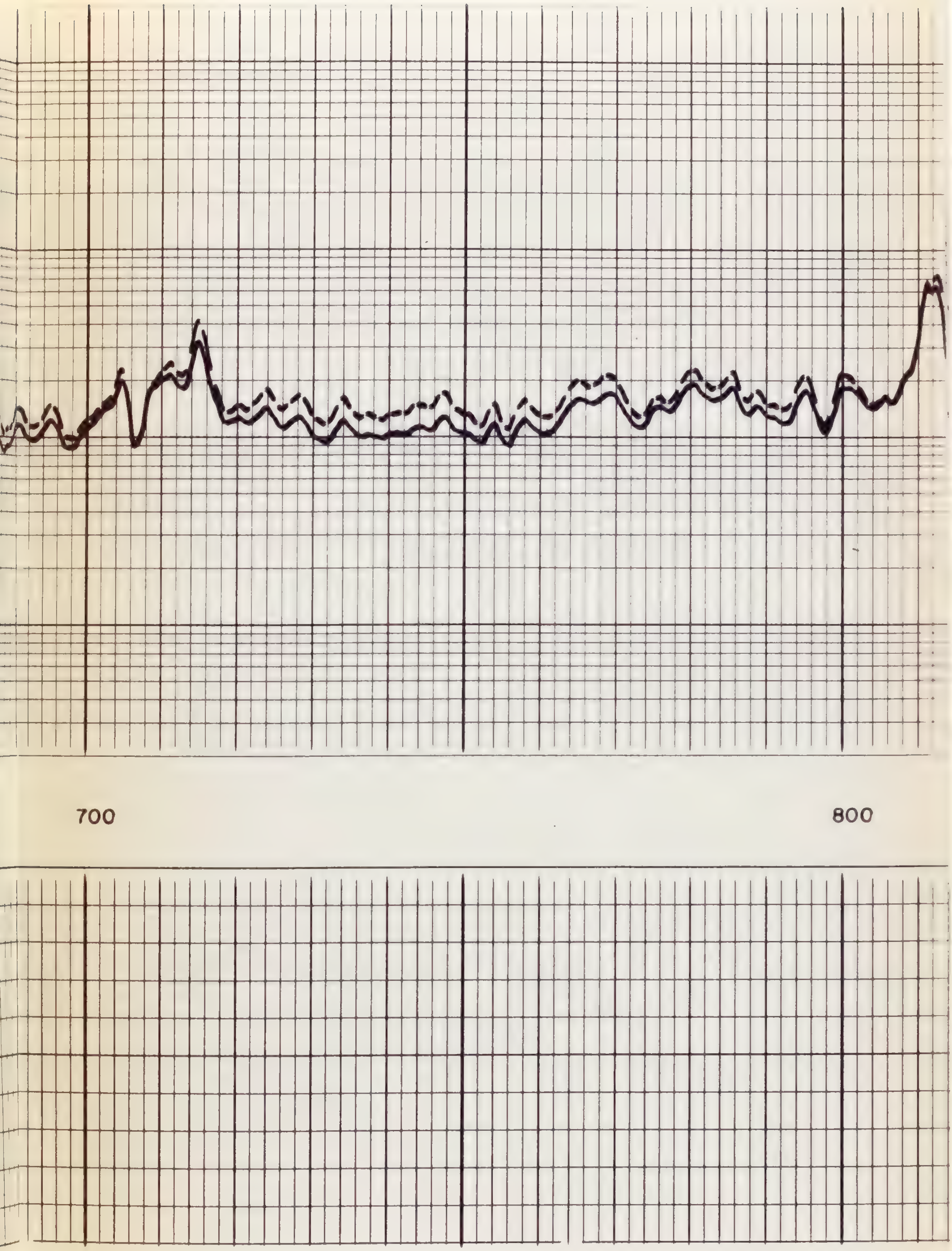
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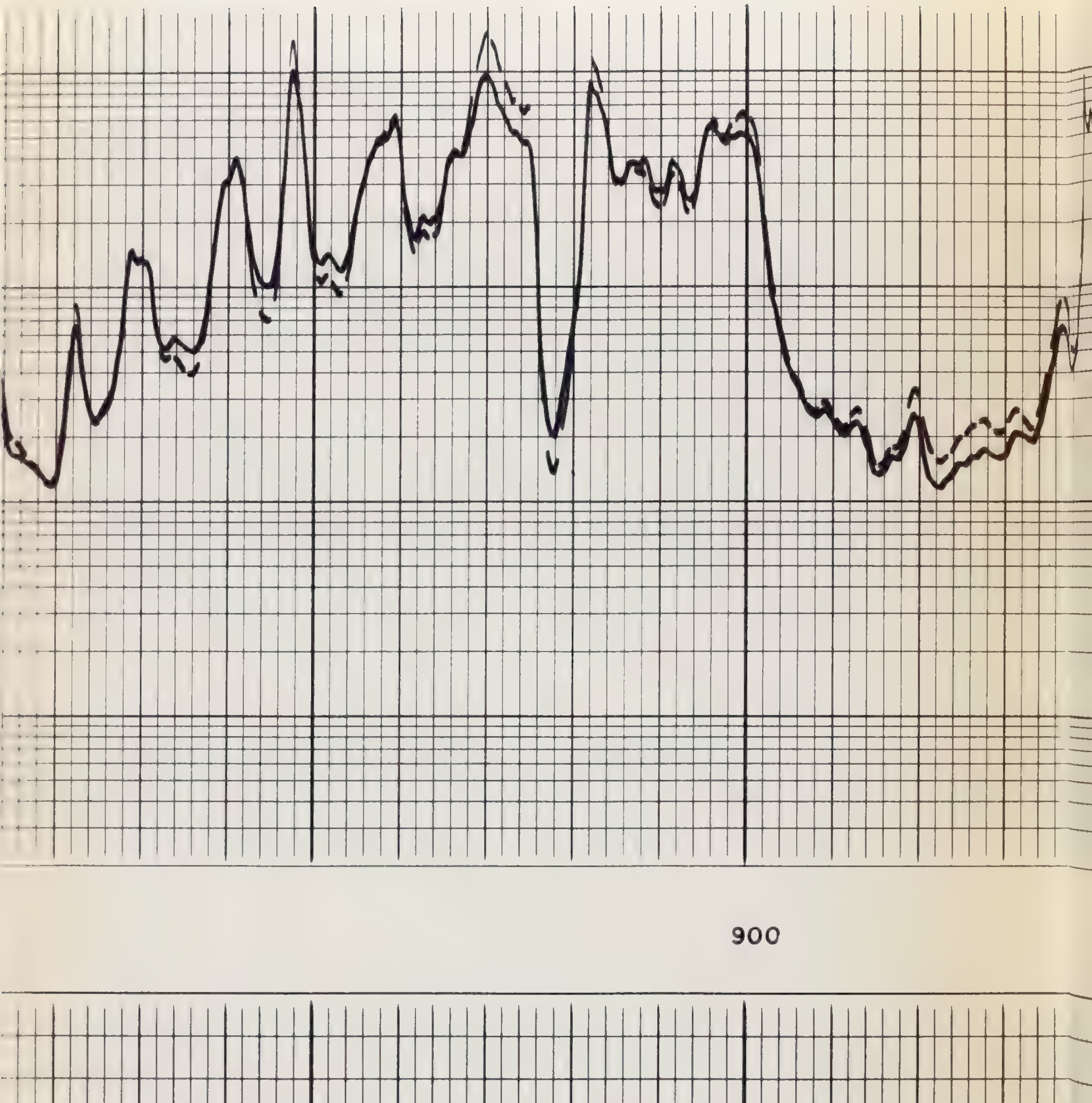
800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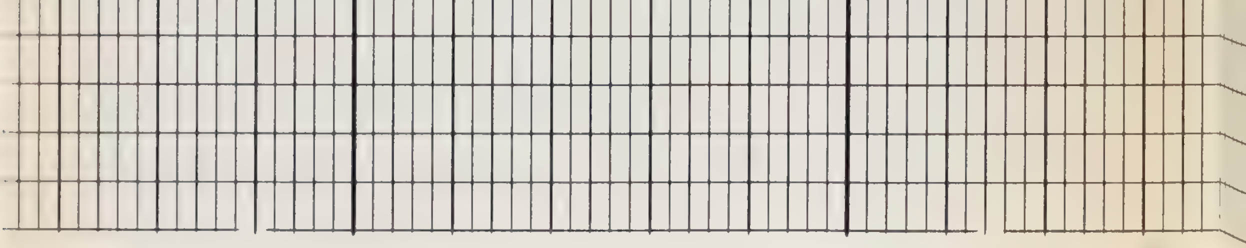

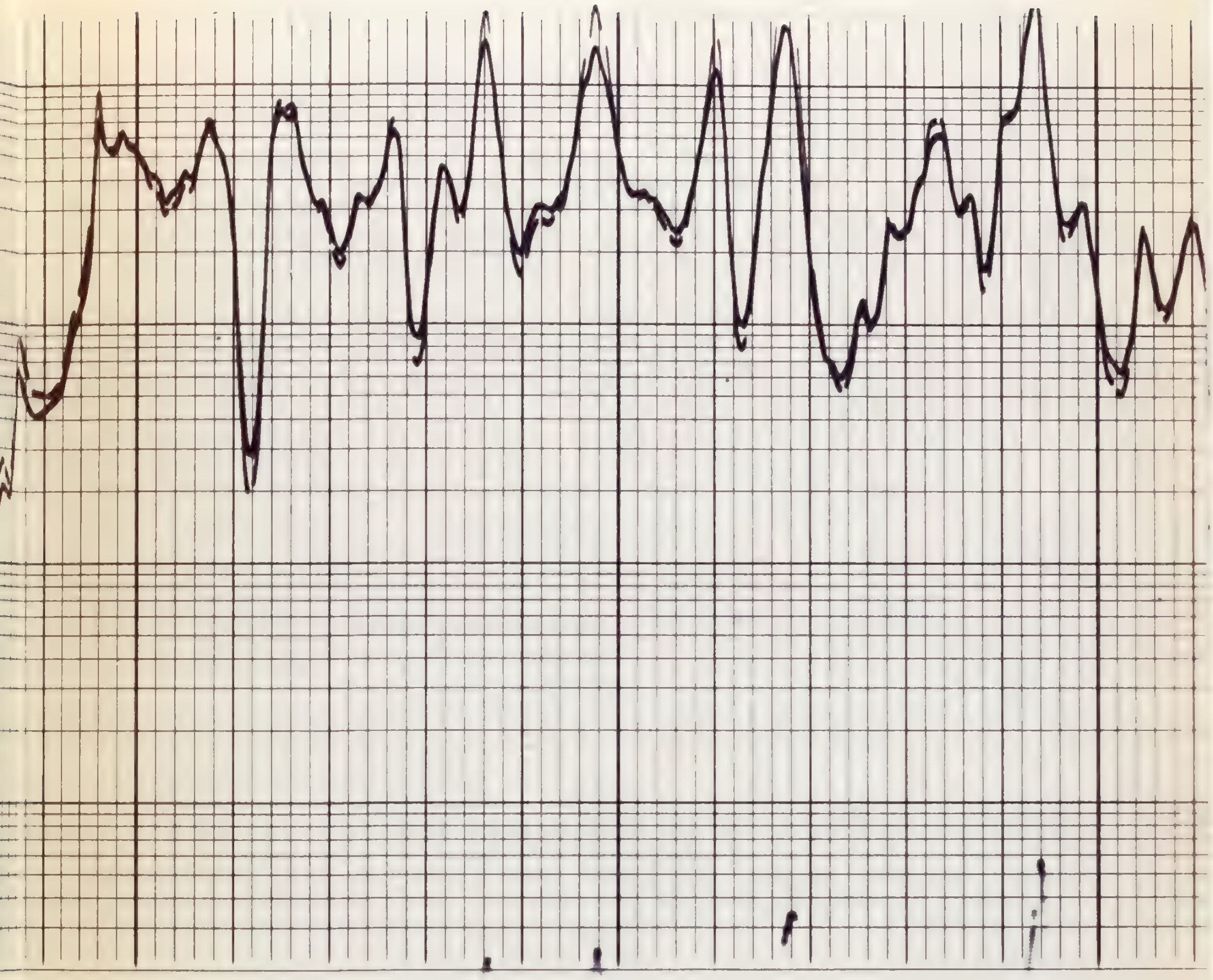

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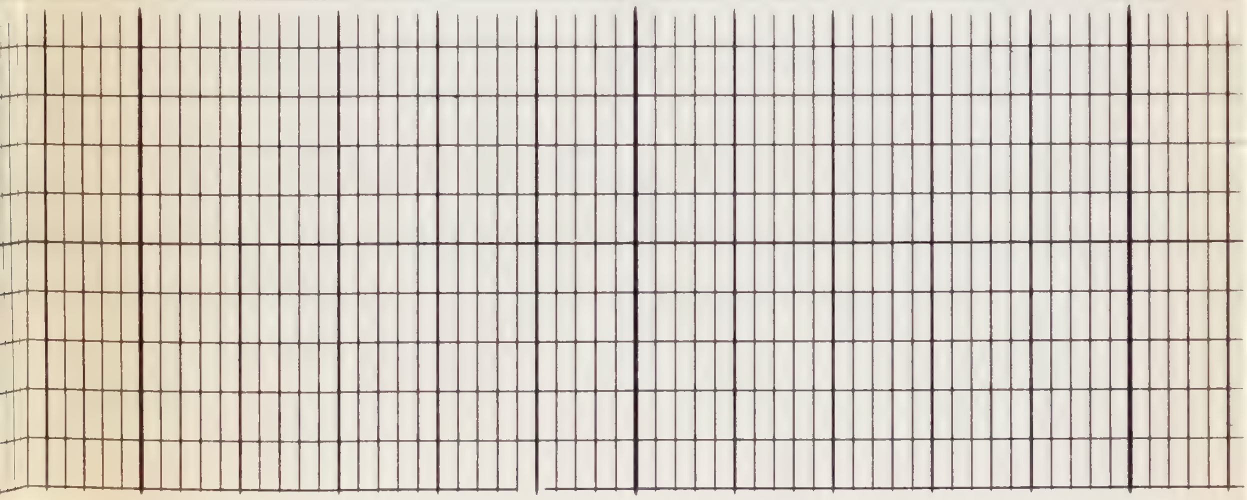

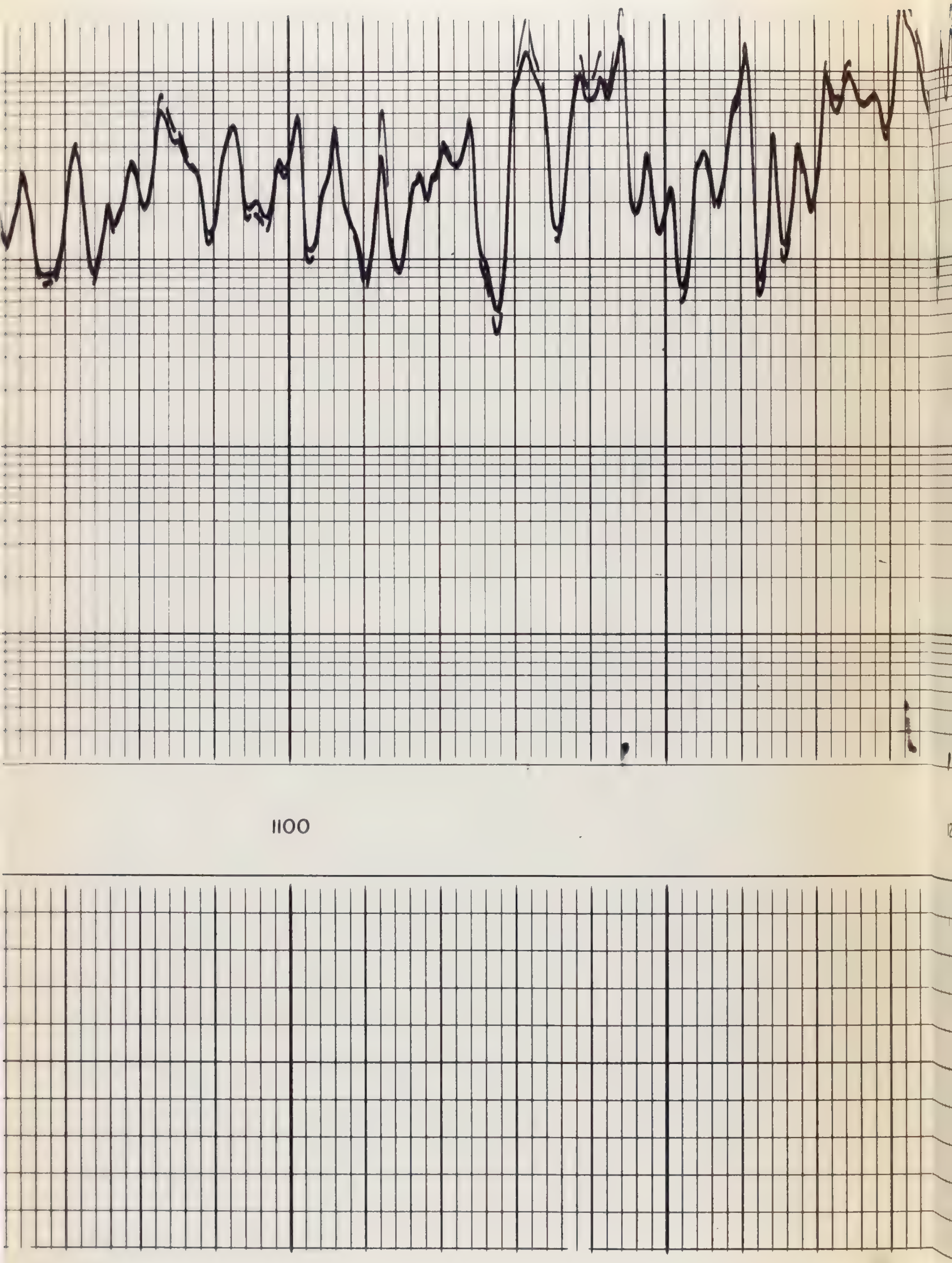
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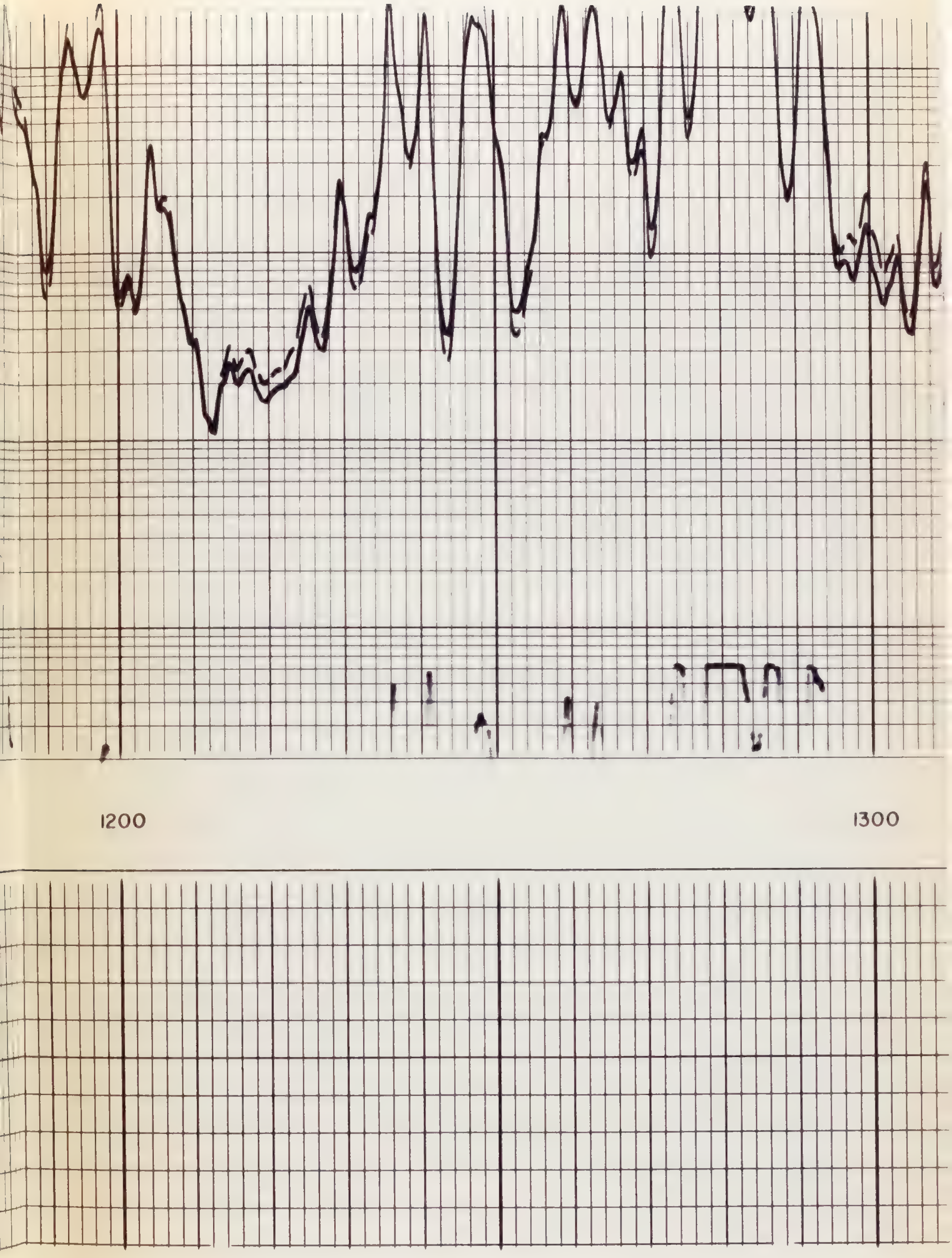
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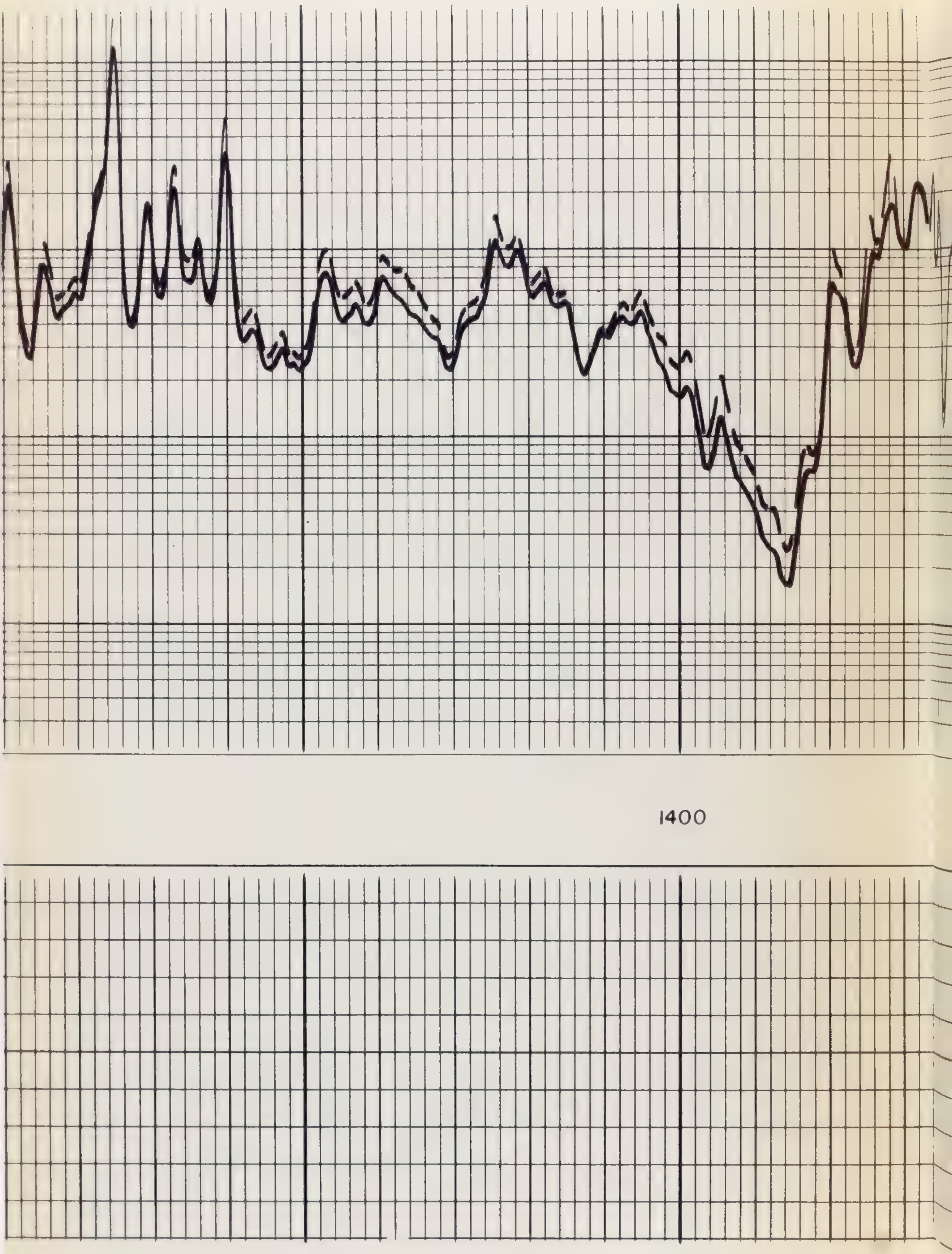
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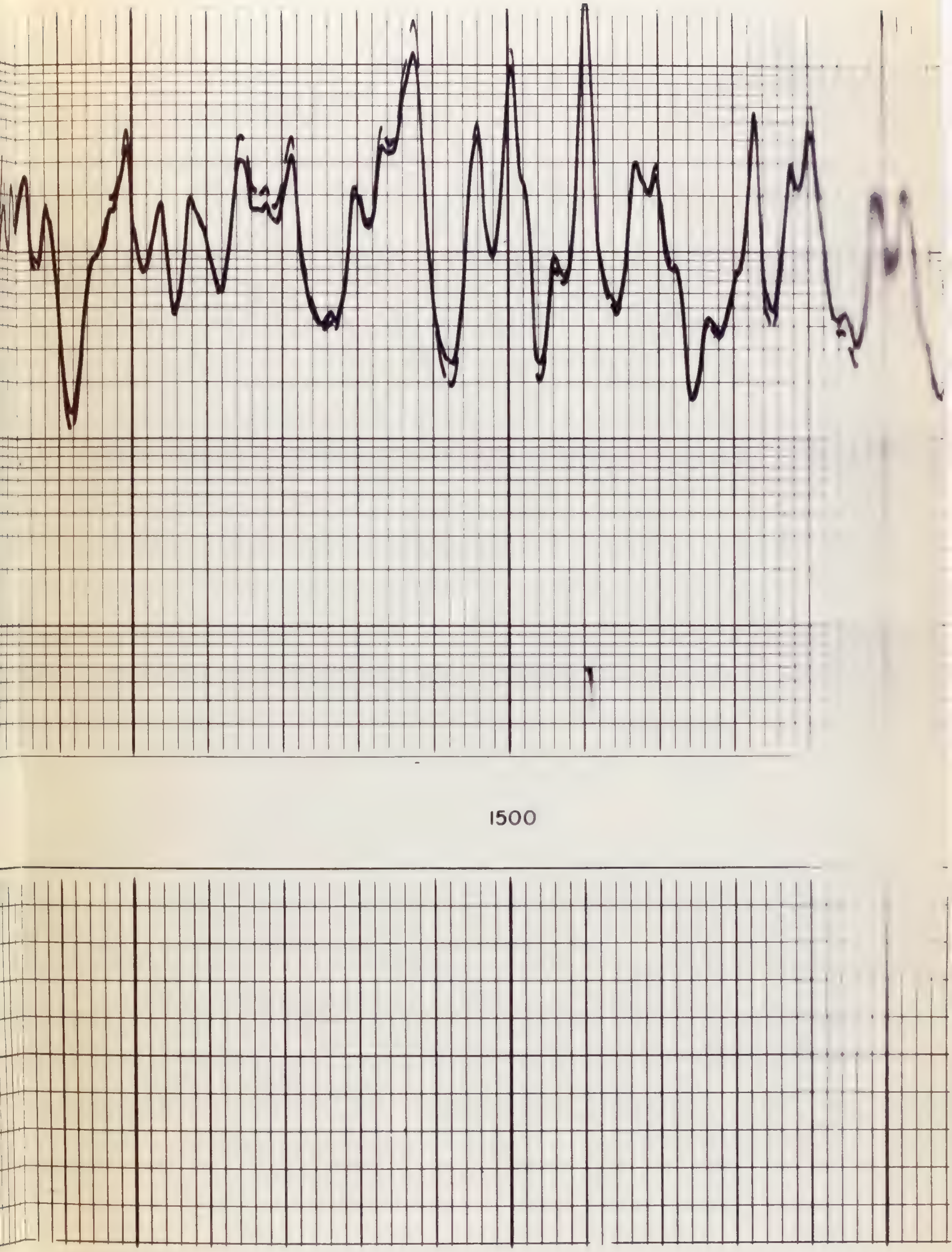
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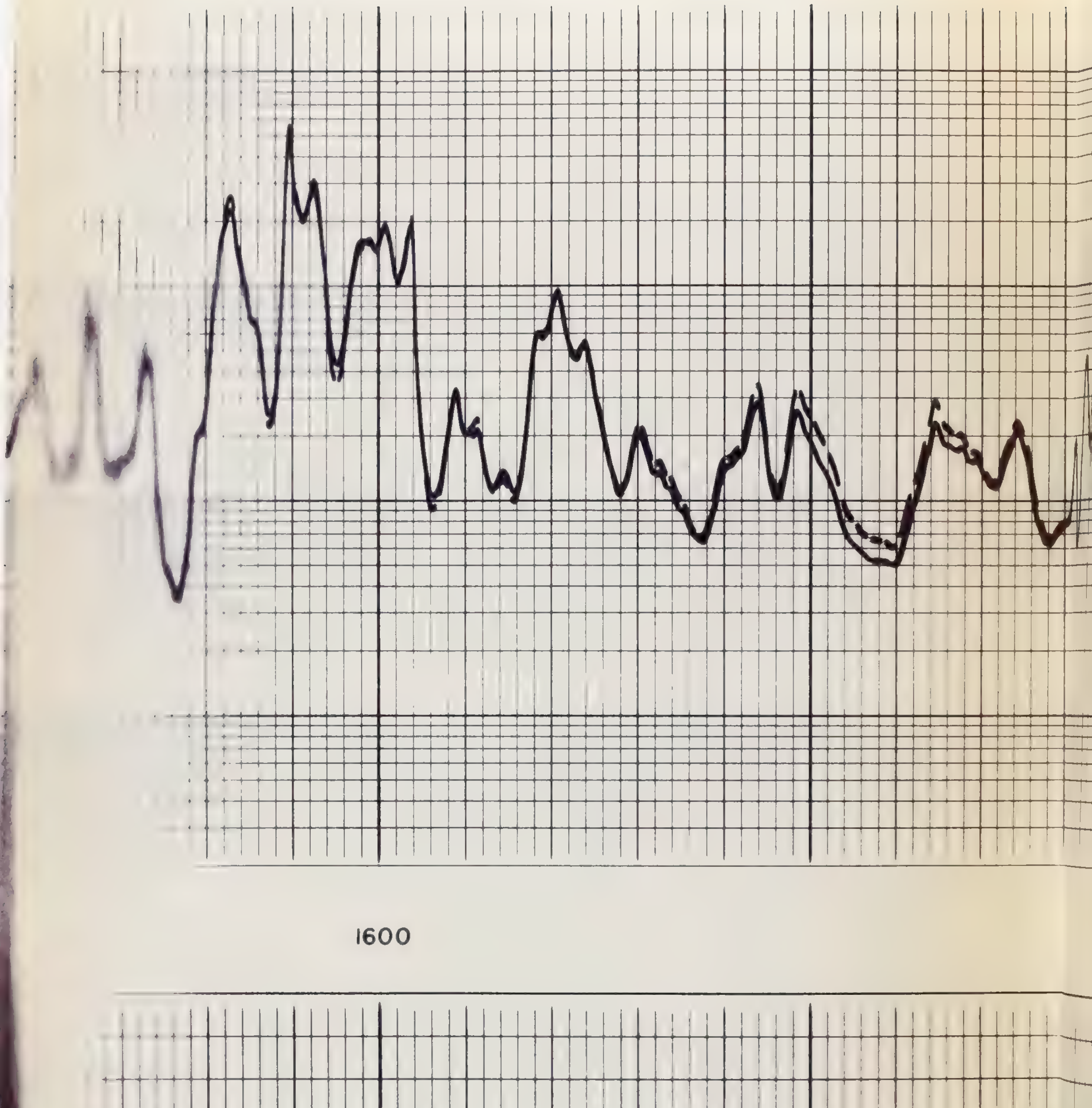
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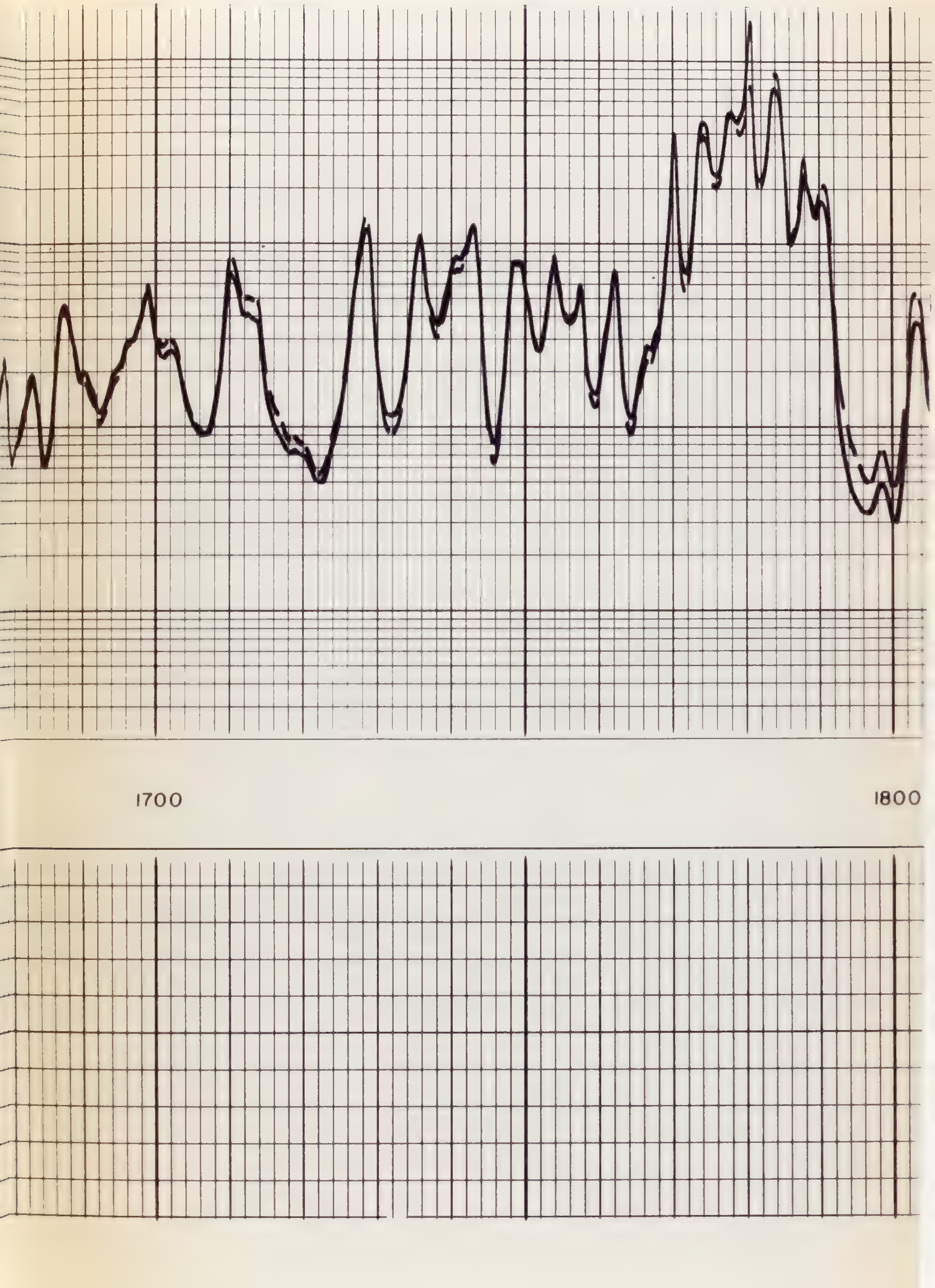
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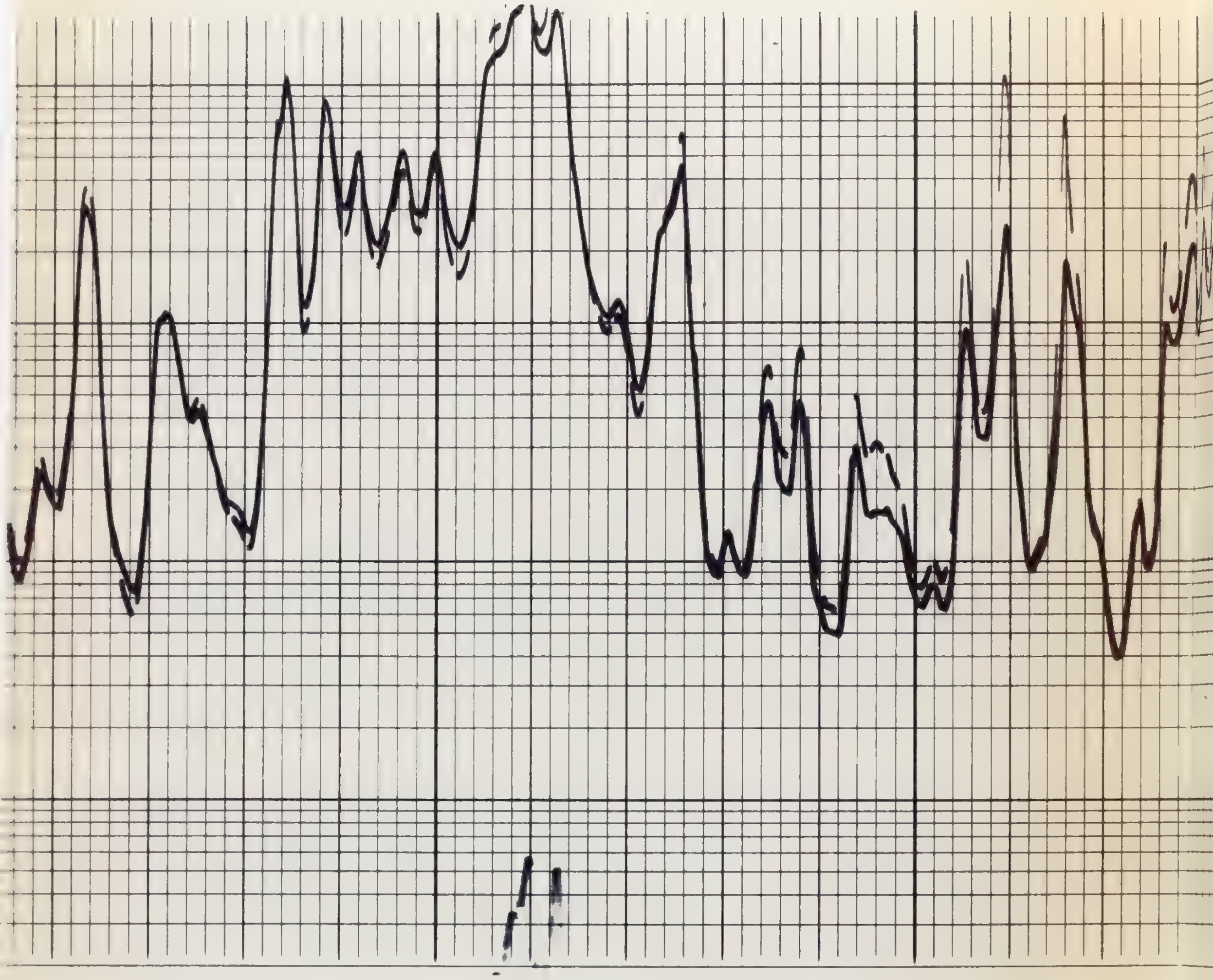
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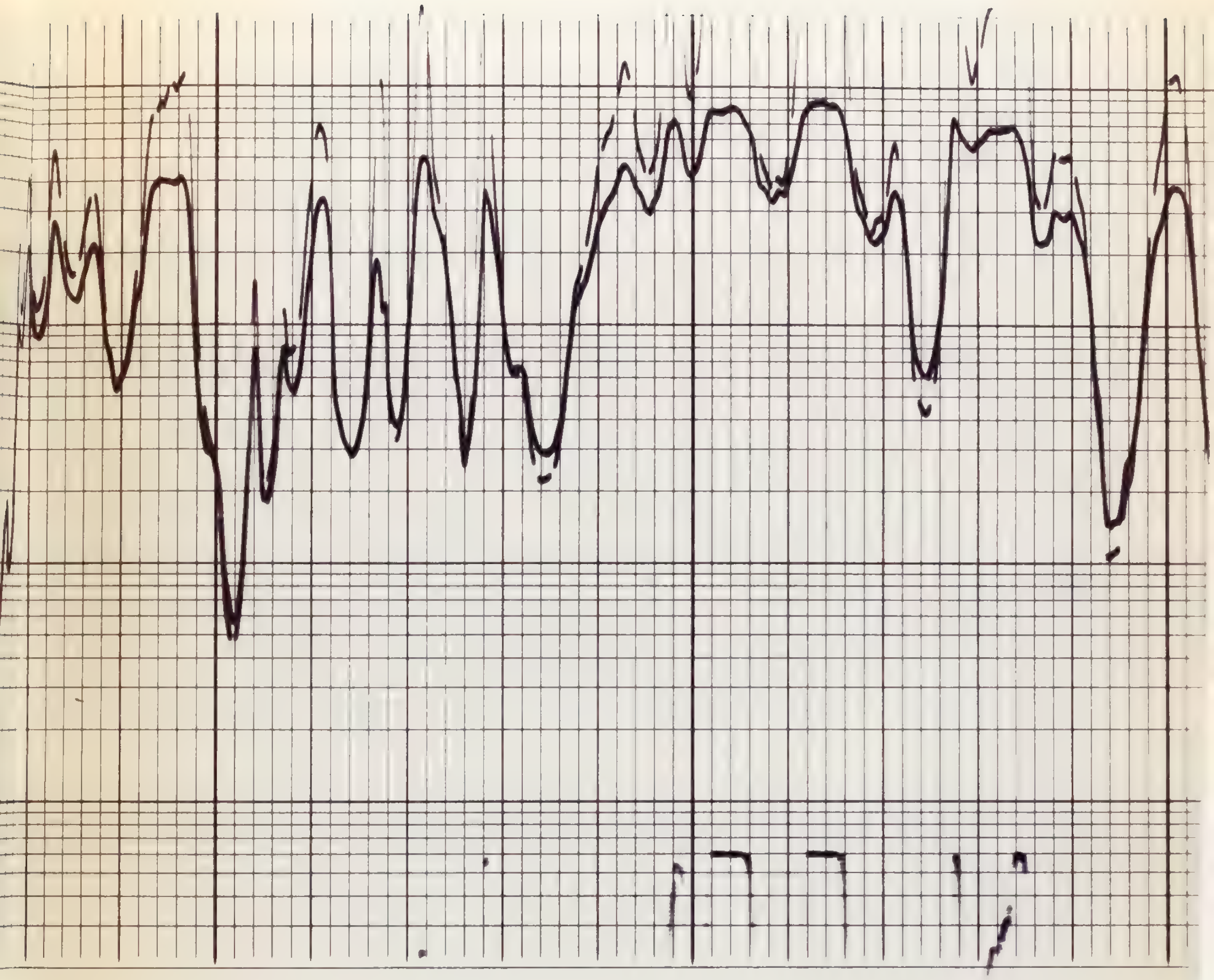

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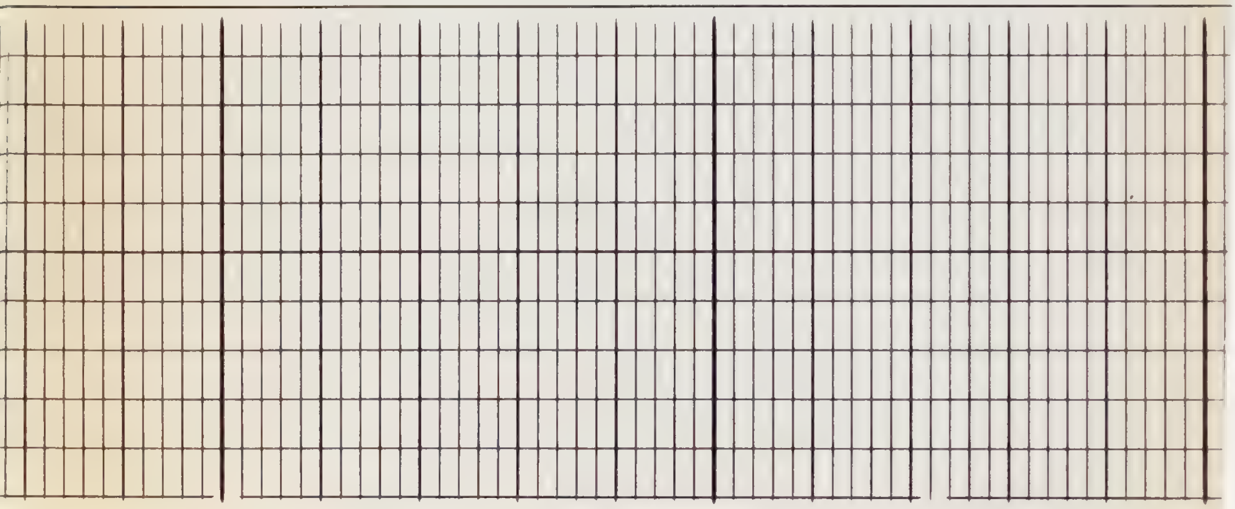

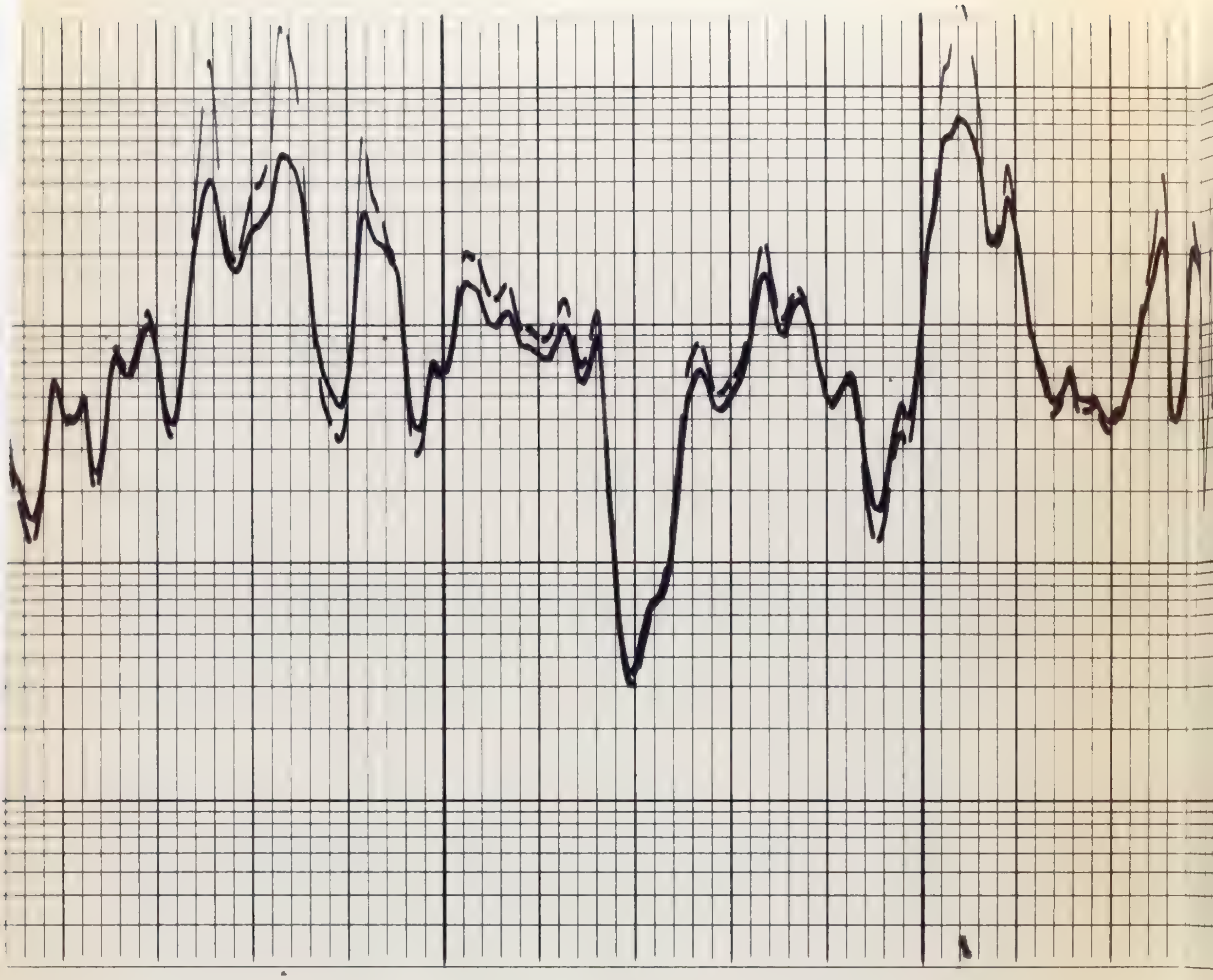

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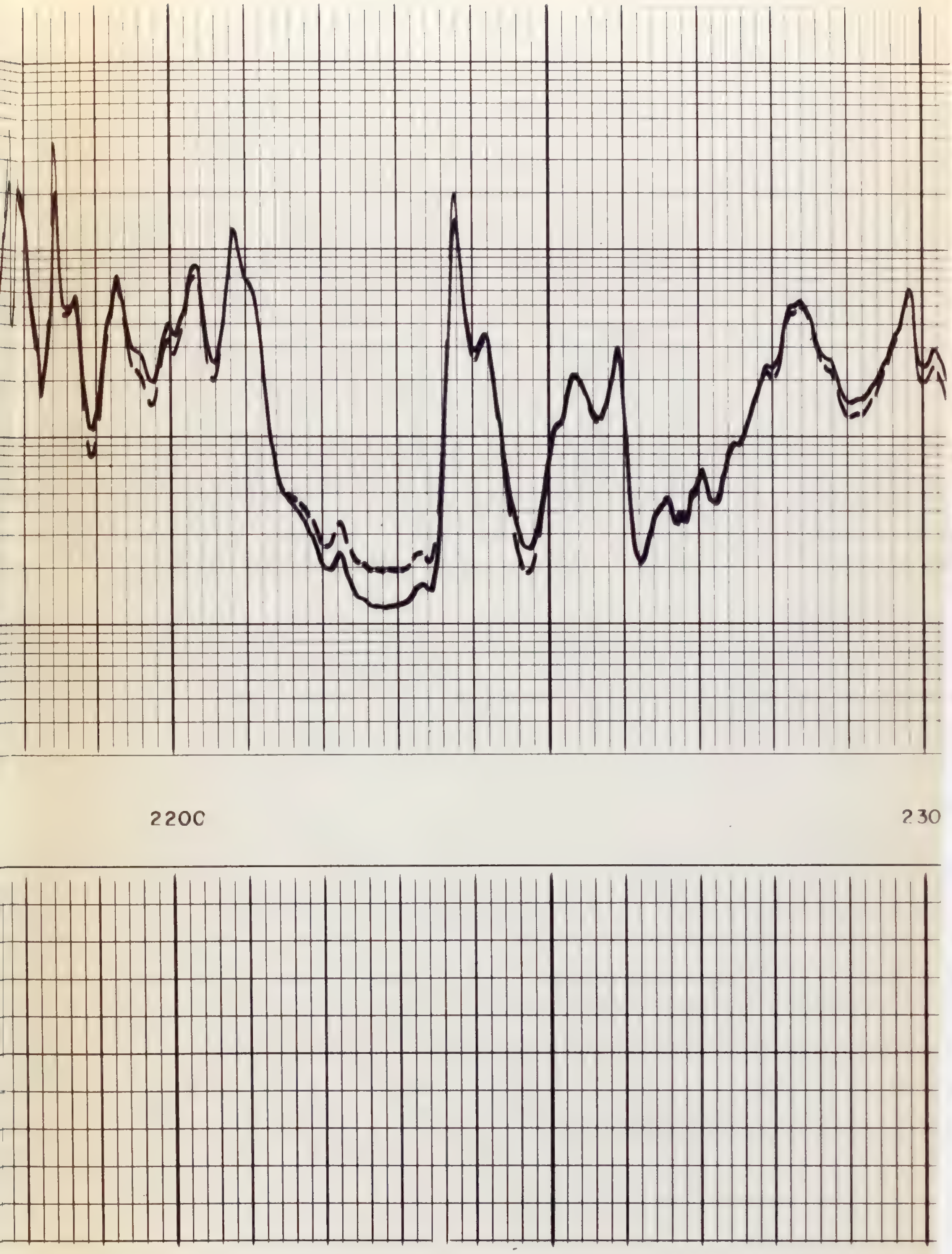
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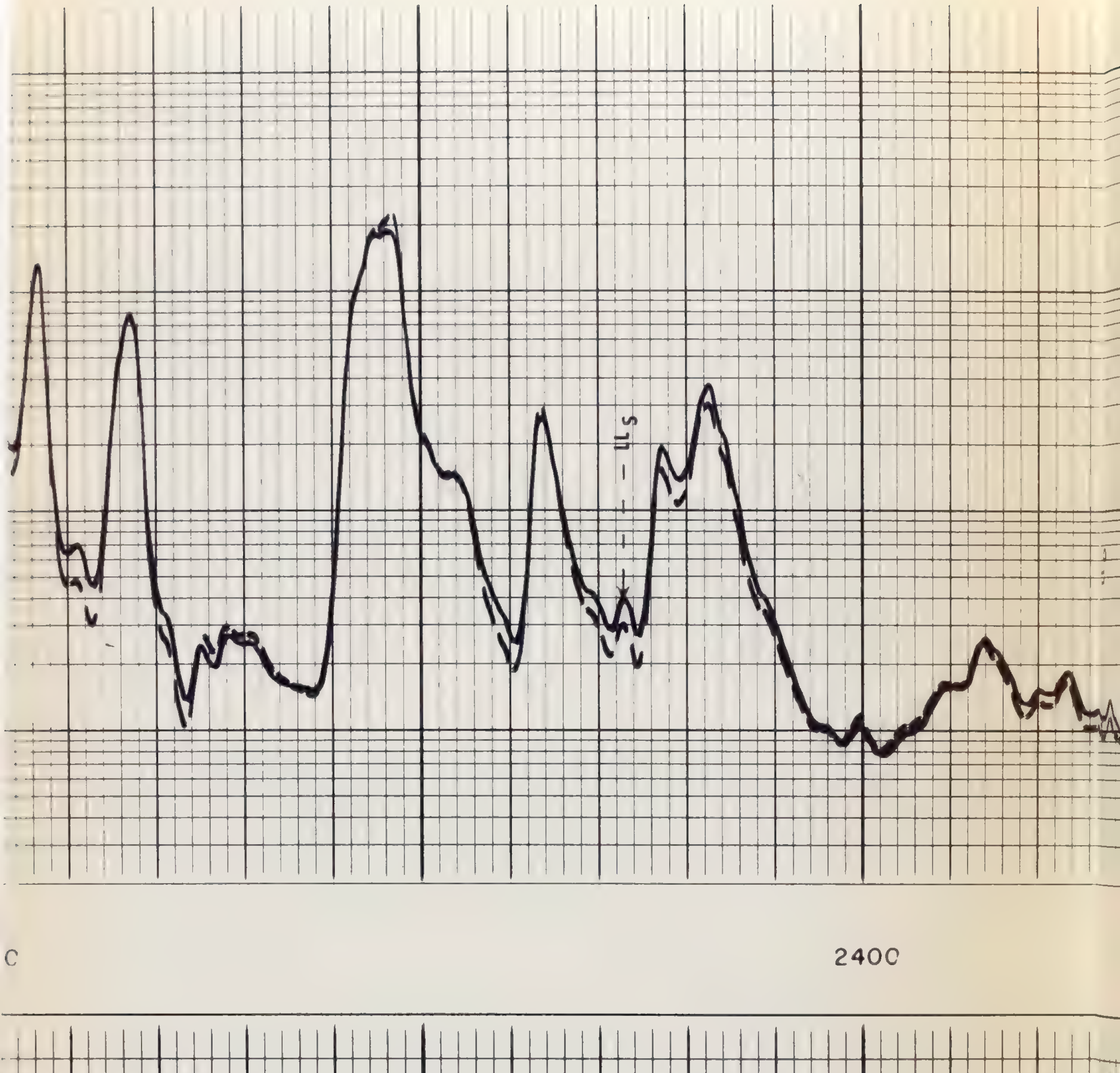
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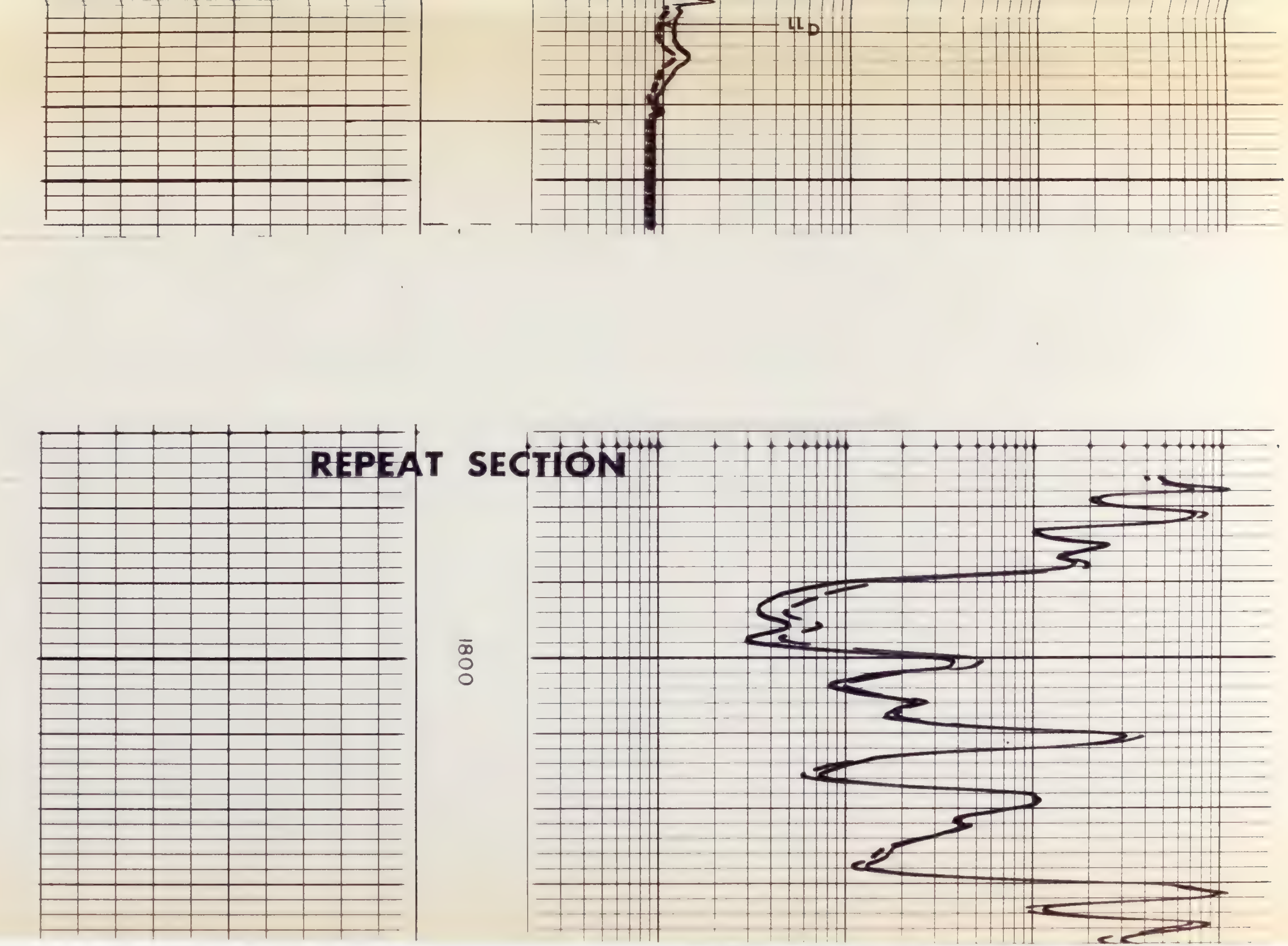
C
2400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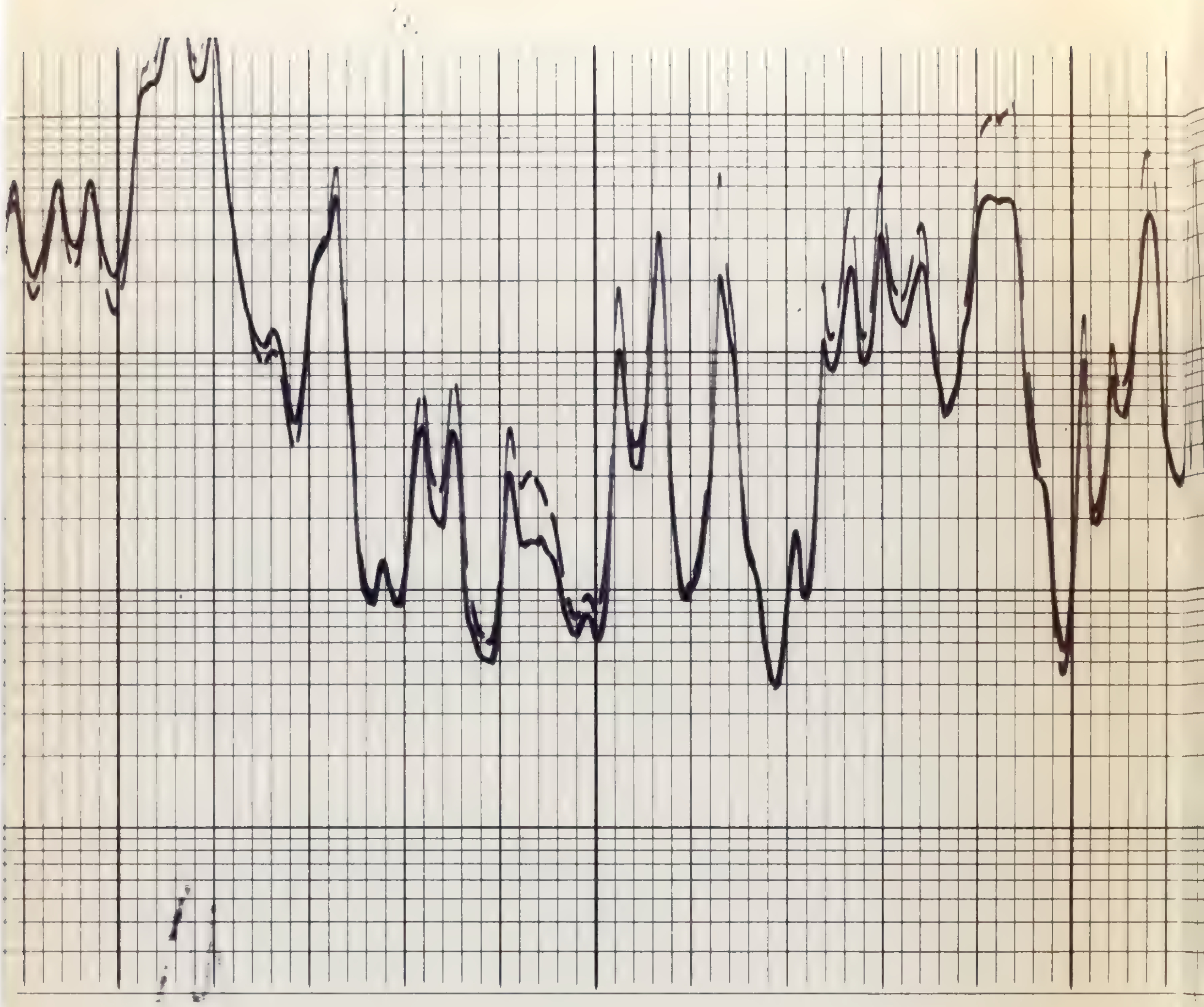
REPEAT SECTION
1800



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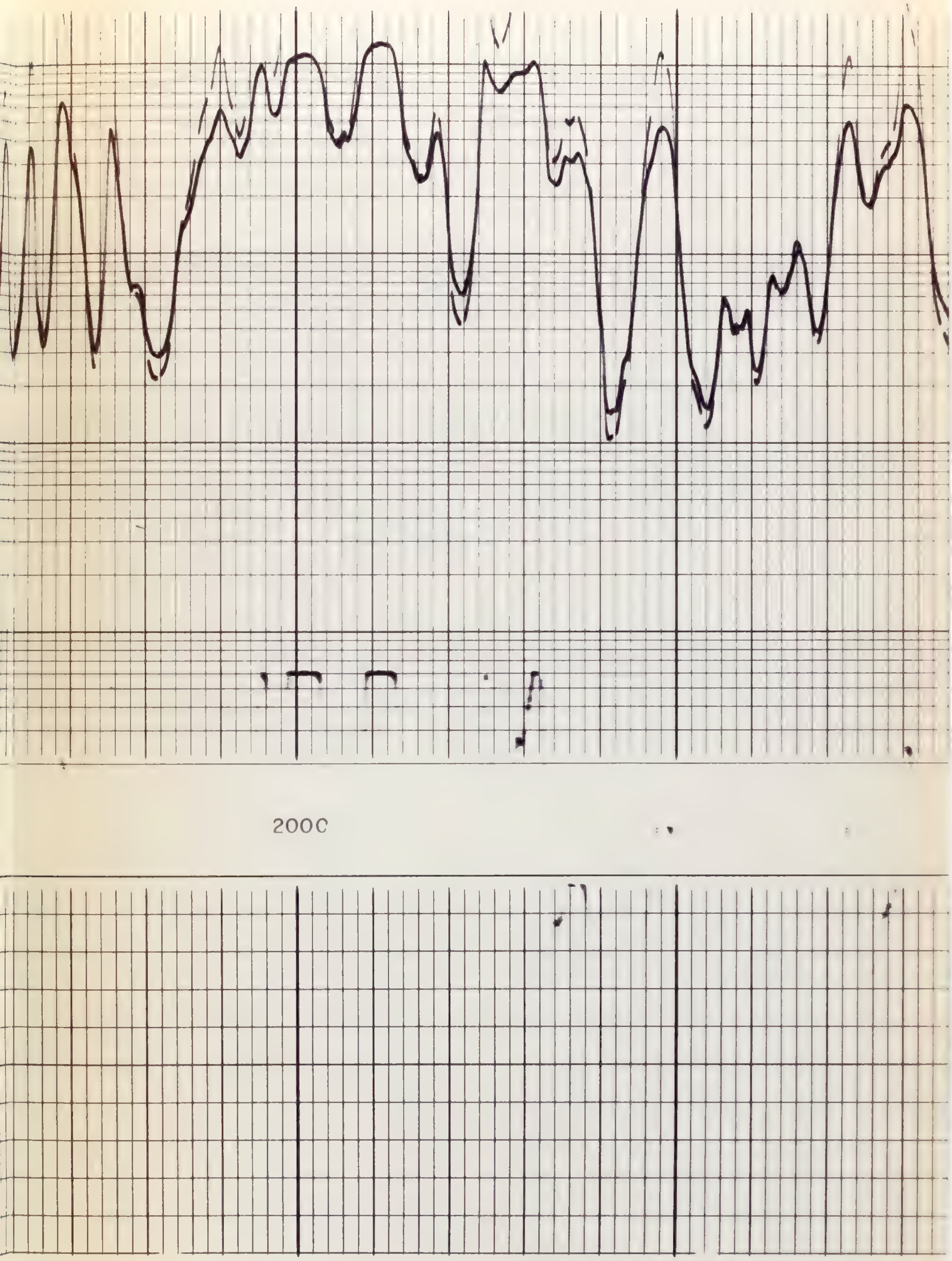
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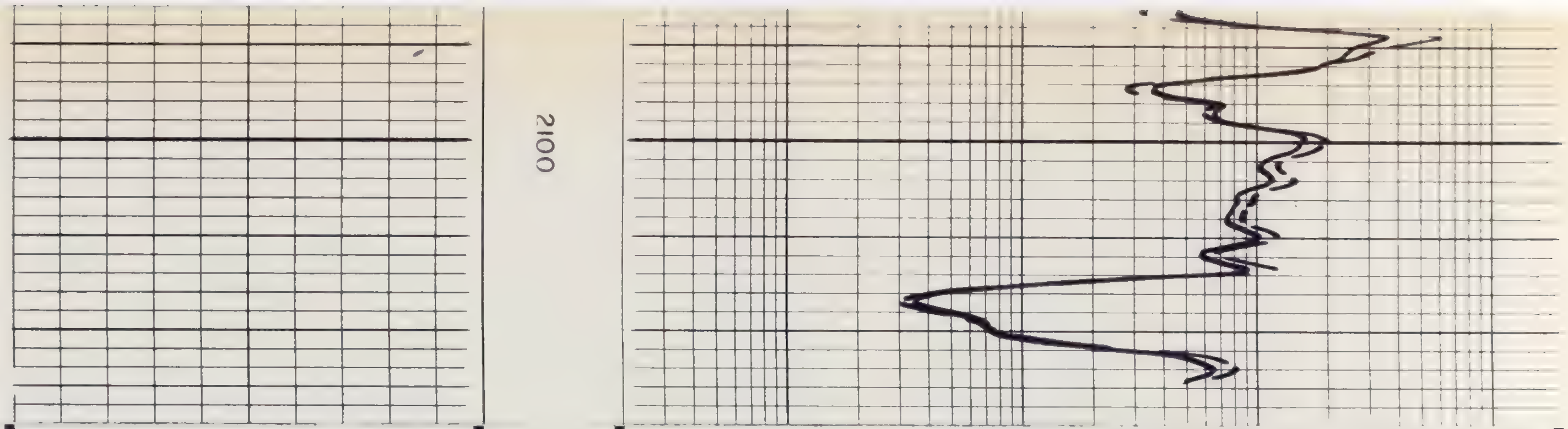


SHALLOW LATEROLOG

0.2 1.0 10 100 1000 2000

DEEP LATEROLOG

0.2 1.0 10 100 1000 2000

DEPTHS

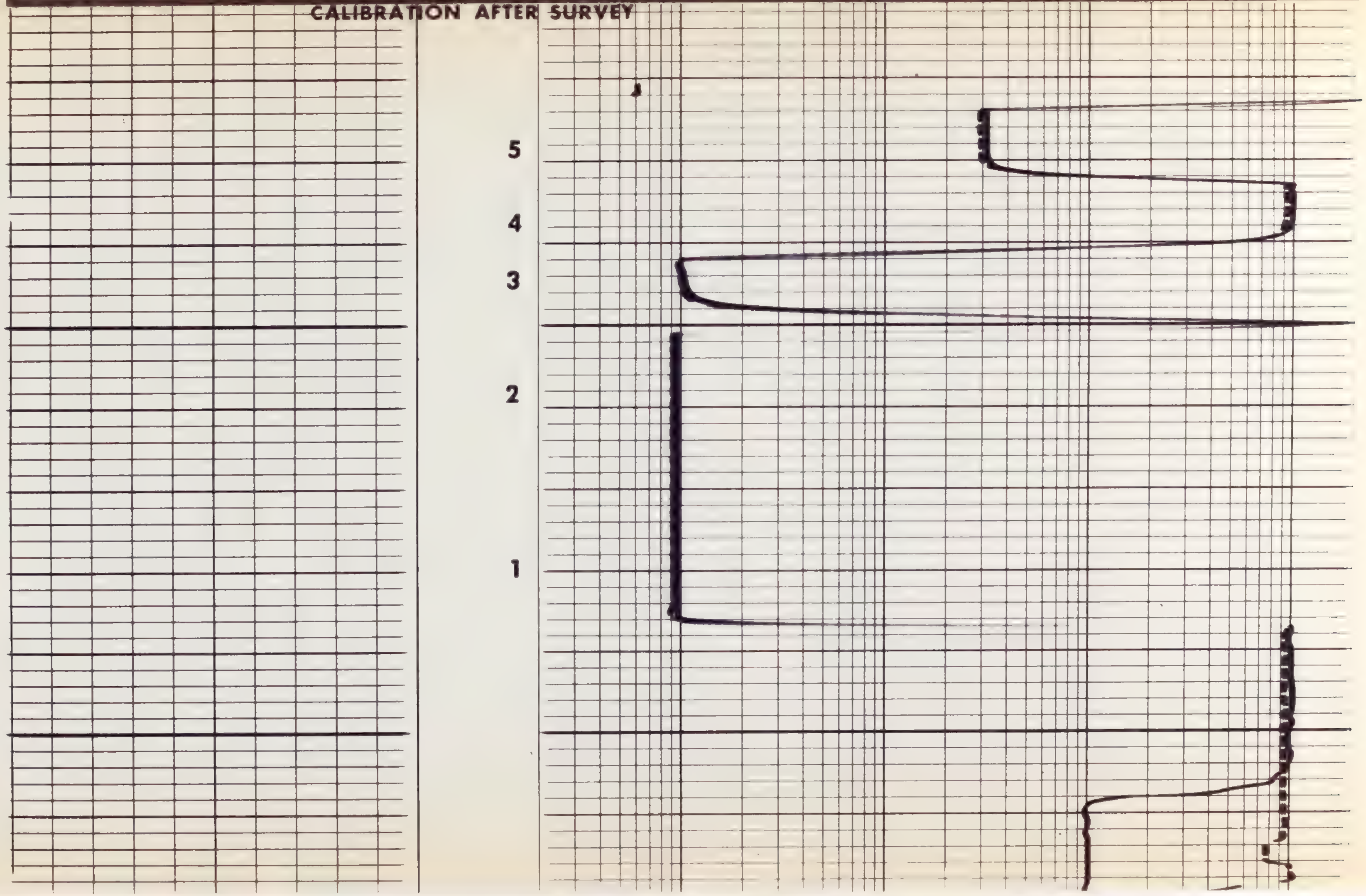
RESISTIVITY
OHMS. M^2/M

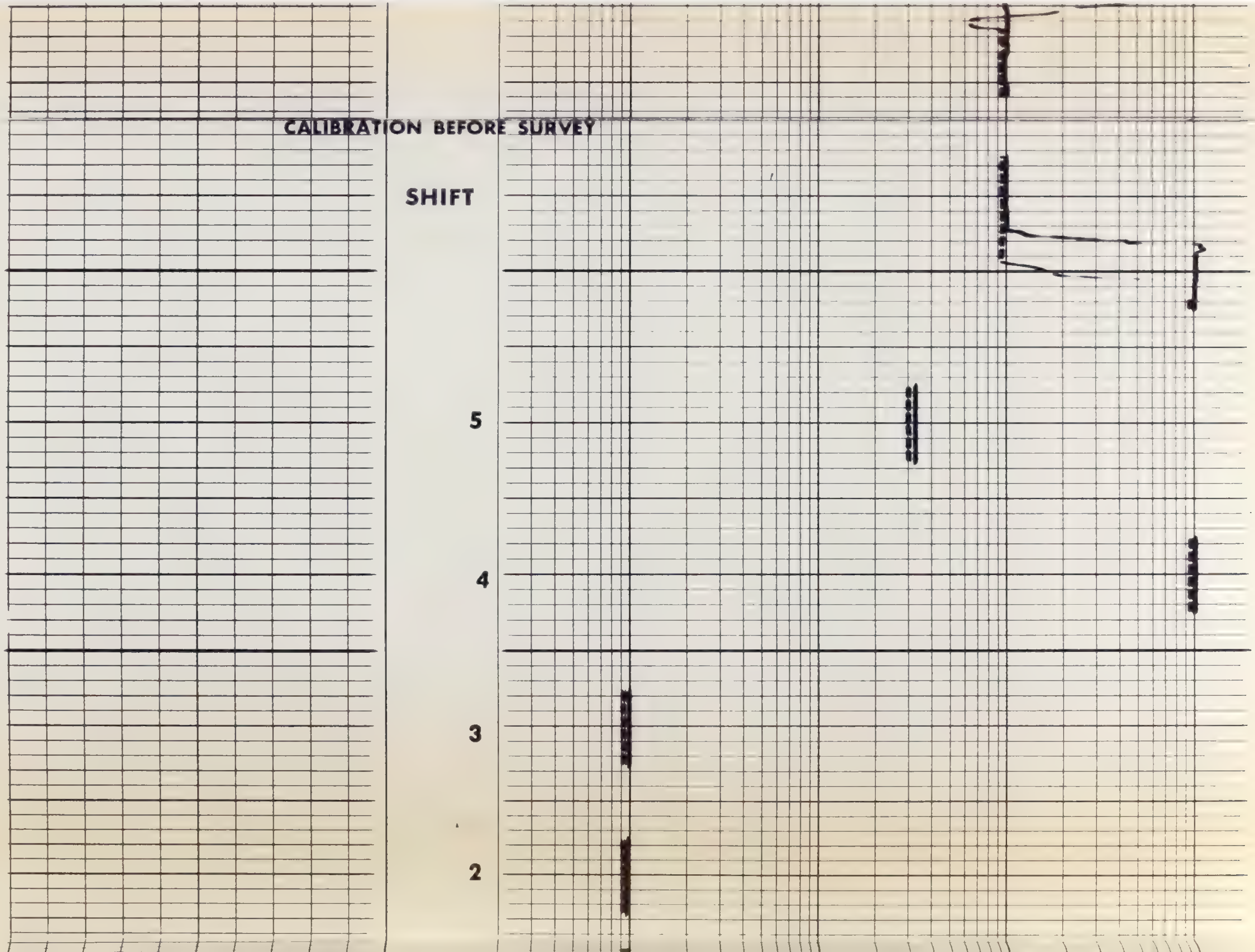
COMPANY ATLANTIC RICHFIELD CO.	Rm ____ @ ____ °F	SCHL.	FR 2442
		SCHL.	TD 2456
WELL SORGHUM GULCH NO. 17	Rmf ____ @ ____ °F	DRLR	TD 2460
		Elev:	
FIELD SORGHUM GULCH	Rmc ____ @ ____ °F		KB 7044
			DF 7043
COUNTY RIO BLANCO STATE COLORADO	BHT ____ °F		GL 7036

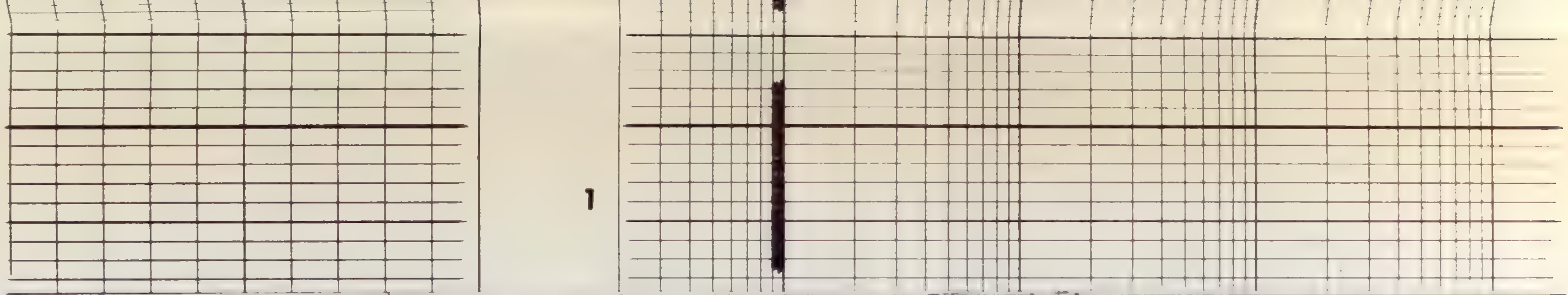
CALIBRATION RECORD

COUNTY STATE COLORADO BHT F

CALIBRATION RECORD




CALIBRATION BEFORE SURVEY
SHIFT
5
4
3
2



CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD CO.

WELL SORGHUM GULCH NO.17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Rm ____ @ ____ °F

Rmf ____ @ ____ °F

Rmc ____ @ ____ °F

BHT ____ °F

SCHL. FR 2442

SCHL. TD 2456

DRLR TD 2460

Elev:

KB 7044

DF 7043

GL 7036

SWS-1975-A

COUNTY RIO BLANCO

Perm
Log
Drill

Date
Run
Dep
Dep
Btm.
Top
Casi
Casi
Bit S
Typ
Fluid
De
pH
Sour
R_m
R_m
R_m
So
R_m
Time
Max
Equ
Rec
Wit

Schlumberger

BOREHOLE COMPENSATED SONIC LOG - GAMMA RAY

(WITH CALIPER)

COUNTY RIO BLANCO
FIELD or LOCATION SIRGHUM GULCH
WELL SORGHUM GULCH # 17
COMPANY ARCO

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.
436'FWL & 181' FSL
Sec. 16 Twp. 35 Rge. 46W

Other Services:
DLL
FDC-GR
HRT

Permanent Datum: GL ; Elev.: 7036
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 7044
D.F. 7043
G.L. 7036

Date	1/12/75			
Run No.	ONE			
Depth—Driller	2460			
Depth—Logger	2454			
Btm. Log Interval	2446			
Top Log Interval	0			
Casing—Driller	8 5/8 @ 56	@	@	@
Casing—Logger	60			
Bit Size	6 3/4			
Type Fluid in Hole	AIR MIST			
Fluid Level	520			
Dens. | Visc.				
pH | Fluid Loss	ml	ml	ml	m
Source of Sample	AIR DRILLED			
R_m @ Meas. Temp.	@ °F	@ °F	@ °F	@ °
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@ °
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@ °
Source: R_{mf} | R_{mc}				
R_m @ BHT	@ °F	@ °F	@ °F	@ °
Time Since Circ.	18W			
Max. Rec. Temp.	115 °F	°F	°F	°
Equip. | Location	5002 | GJ			
Recorded By	ETTEN WALKEY			
Witnessed By	MR. BURNS			

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date / Sample No.				
Depth - Driller				
Type Fluid in Hole				
Dens. / Visc.				
ph / Fluid Loss		ml		ml
Source of Sample				
R_m @ Meas. Temp.	@	°F	@	°F
R_{mf} @ Meas. Temp.	@	°F	@	°F
R_{mc} @ Meas. Temp.	@	°F	@	°F
Source: R_{mf} / R_{mc}				
R_m @ BHT	@	°F	@	°F
R_{mf} @ BHT	@	°F	@	°F
R_{mc} @ BHT	@	°F	@	°F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Sonic Panel No.	439			
Sonic Cart No.	166			
Sonic Sonde No.	499			
Mem. Panel No.	238			
G.R. Cart. No.	289			
G.R. Panel No.	169			
Caliper No	851			
TTR No.				
Cent. Device				
Stand off - Inches				
Time Const. - Sec.				
Speed - F.P.M.				
	58			

REMARKS

Service Order No. - 22470

STAND OFFS IN SMALL HOLE NOT RUN AS FDC
WOULDNT GO DOWN BUT 3 3/8 LL & HRT
DID. NOT RUN TO GET DEEPER.
NOTE ΔT MZ SHIFT.
STAIR STEPPING ON ΔT ON ALL 3 MMP-B
MEMORY CHANNELS. ILP-A MEMORY KEPT
IN JECTING PIPS EVERY 7½' SO COULDNT
USE IT AT ALL.
COMPRESSED SCALE AMP. RUN.
LOG RUN MOSTLY 1/5 CART GAIN

AMP-VDL:
5' (VT-FR)
NORMAL
53 COPIE
1 MS CRP
TX=1 1/20 CART. GAIN E

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.
GAMMA RAY:	80	500				2

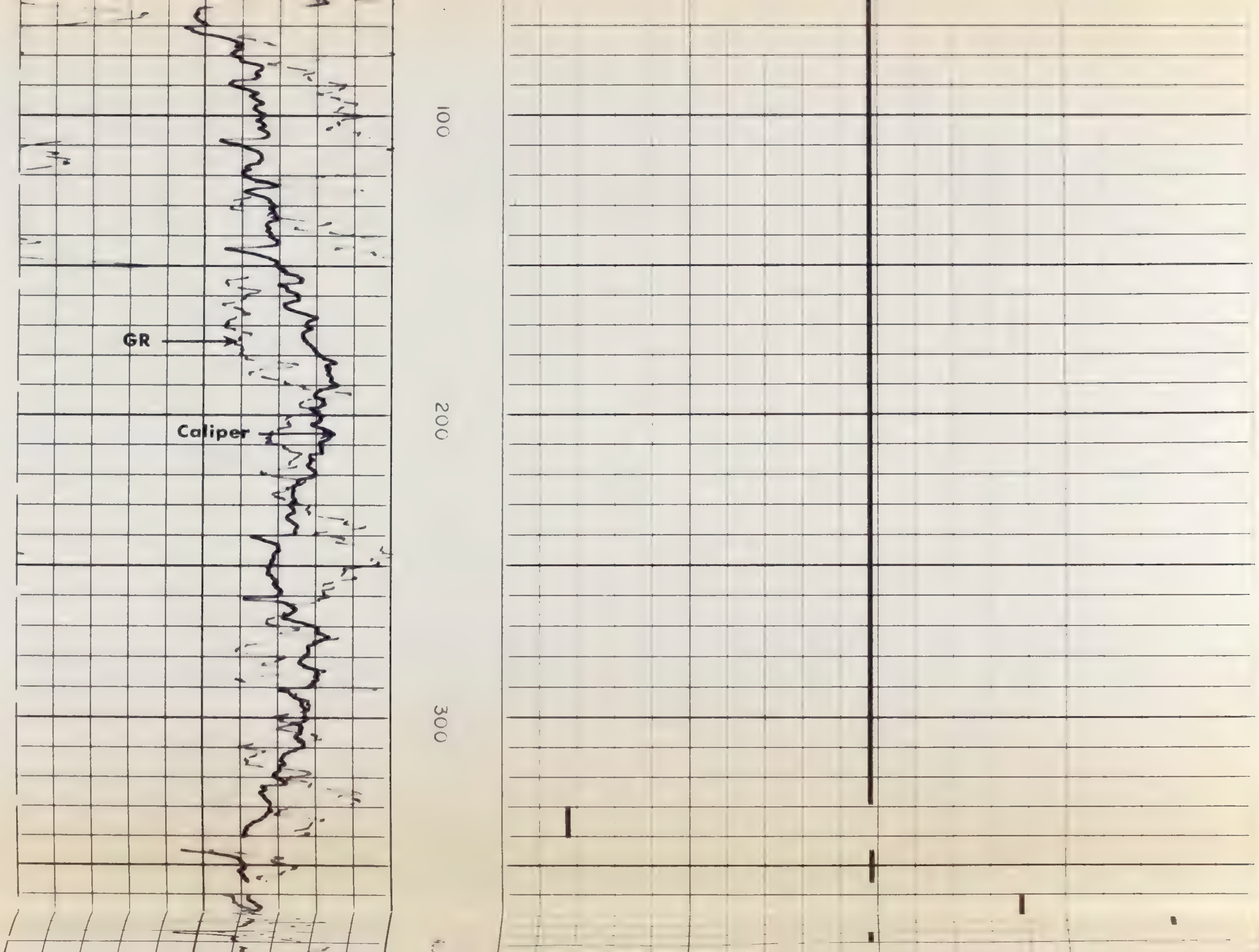
1 MS CRP
TX 1 1/20 CART. GAIN E

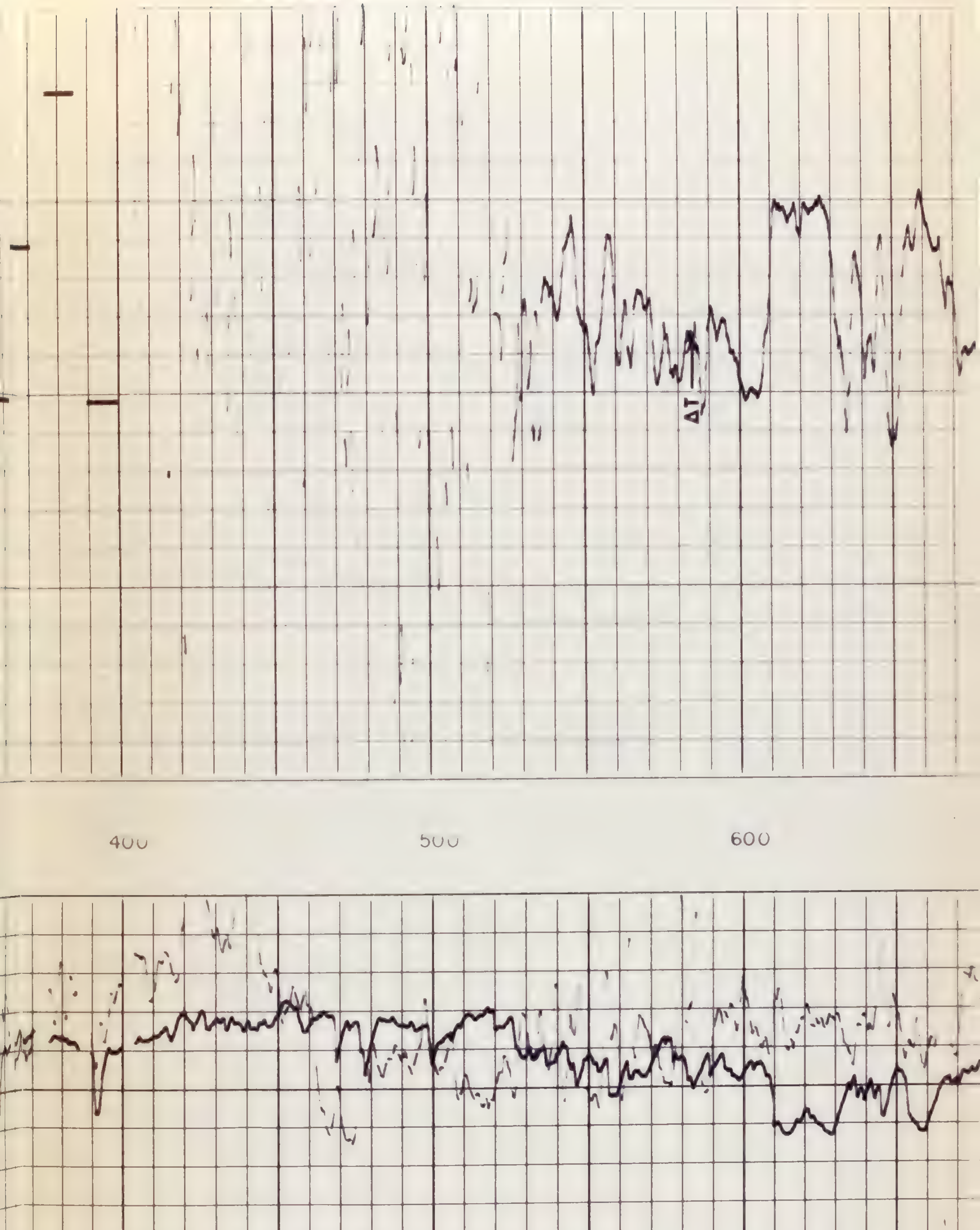
CALIBRATION DATA

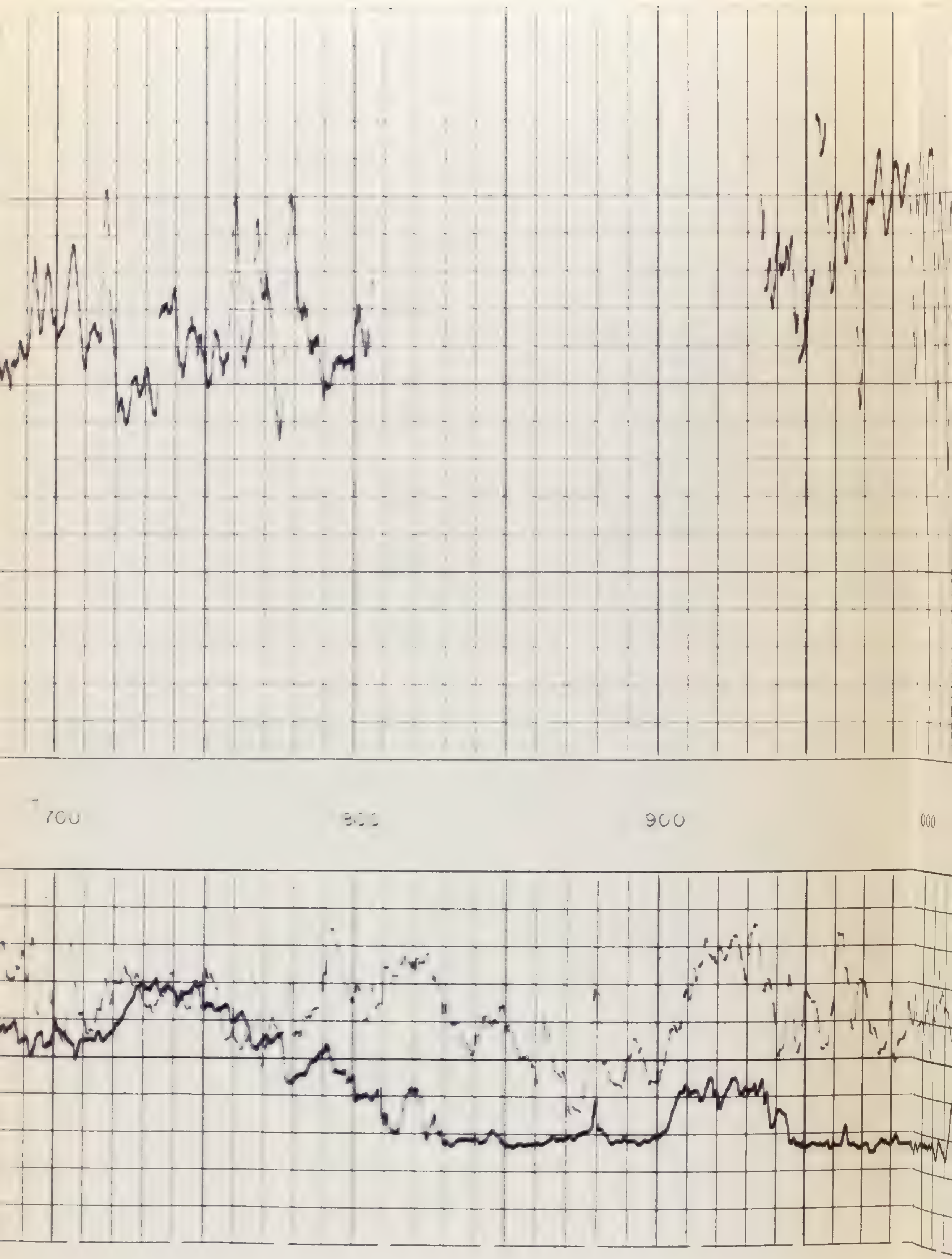
CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.
GAMMA RAY:	80	500				2

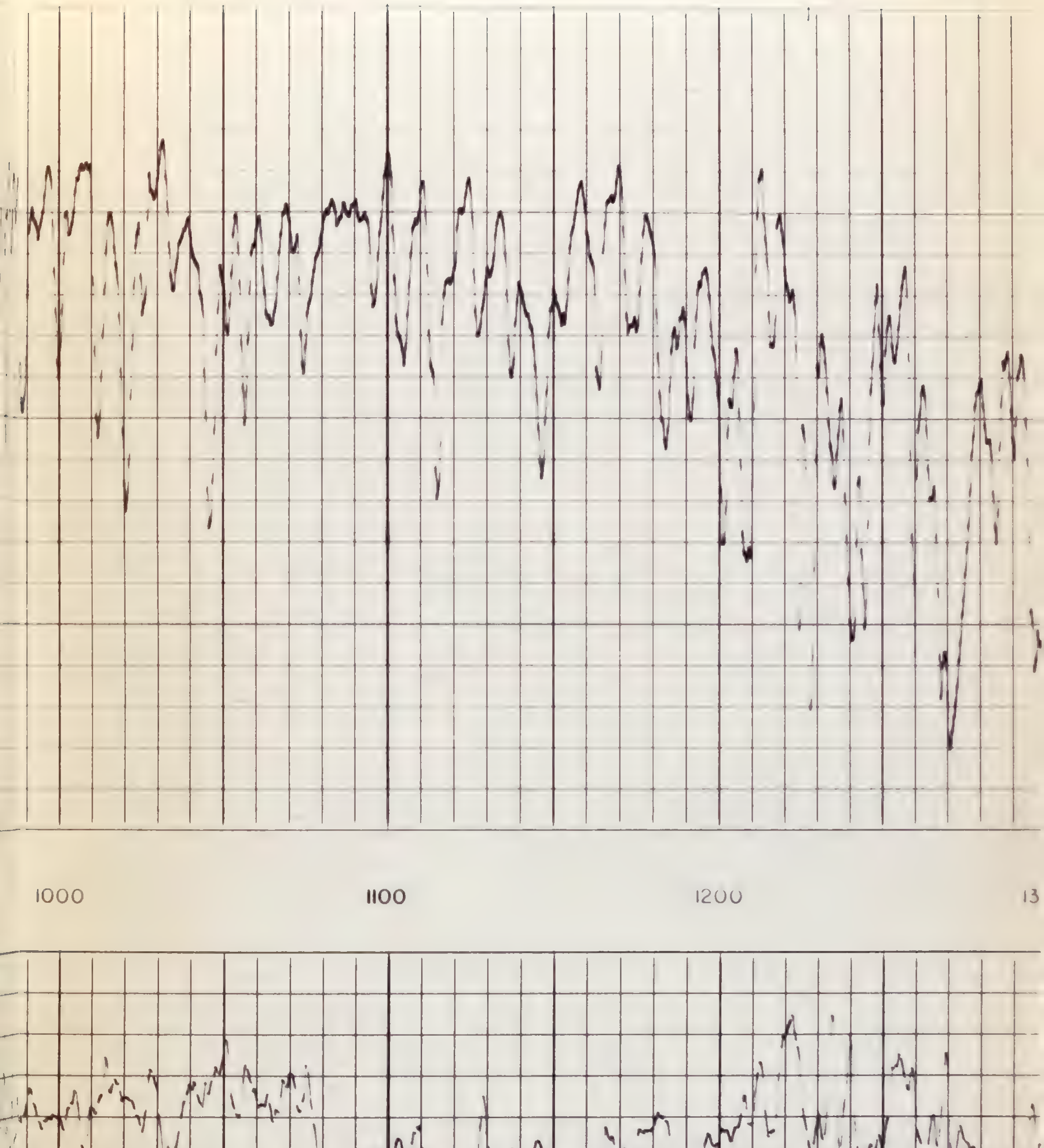
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

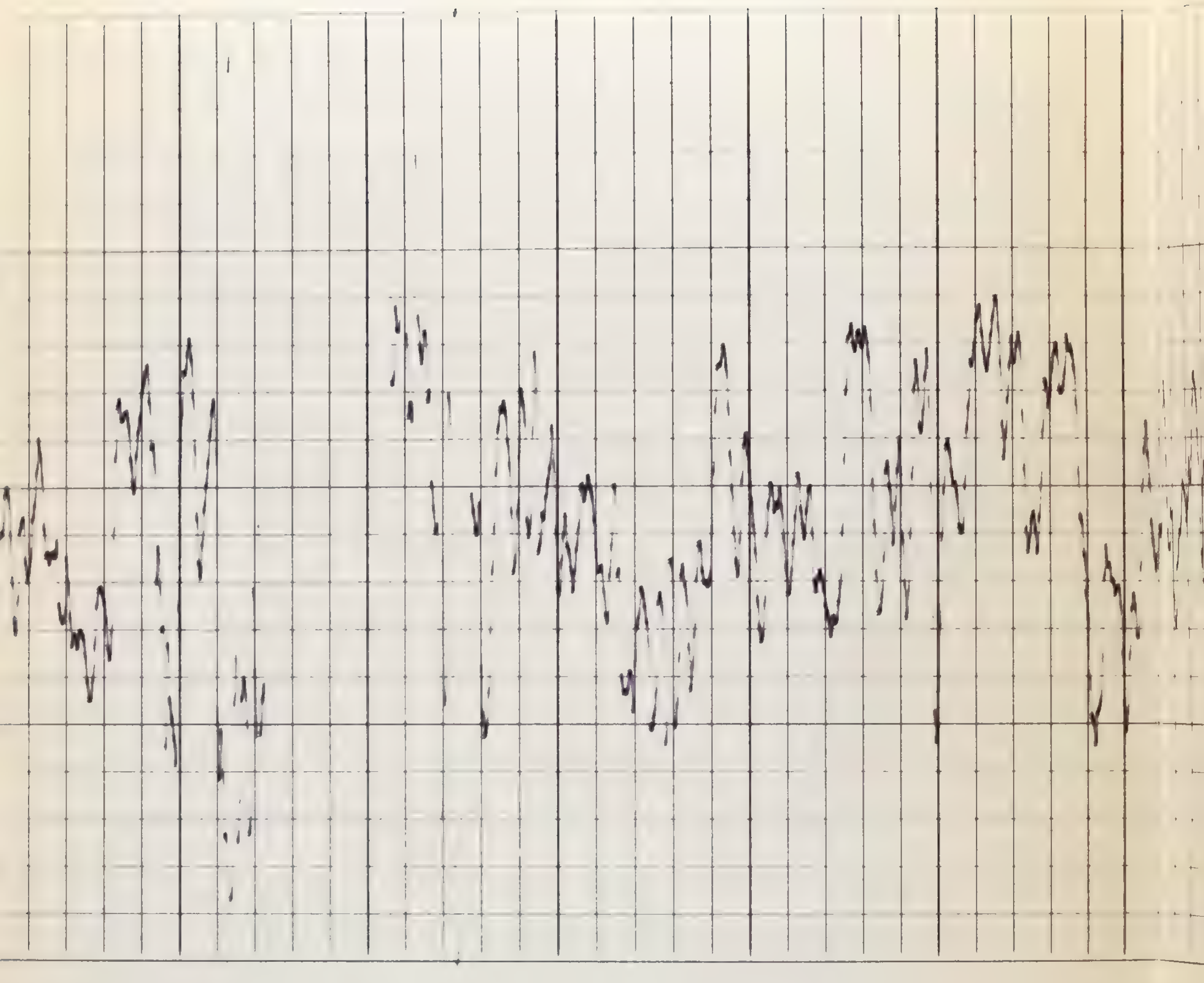
GAMMA RAY API UNITS	DEPTHS	INTERVAL TRANSIT TIME MICROSECONDS PER FOOT
		$T\underline{3'}R_1\underline{2'}R_2$
0 — 150		150 — 100 — 50
150 — 300		200 — 150
CALIPER HOLE DIAM. IN INCHES		
5 — 15		

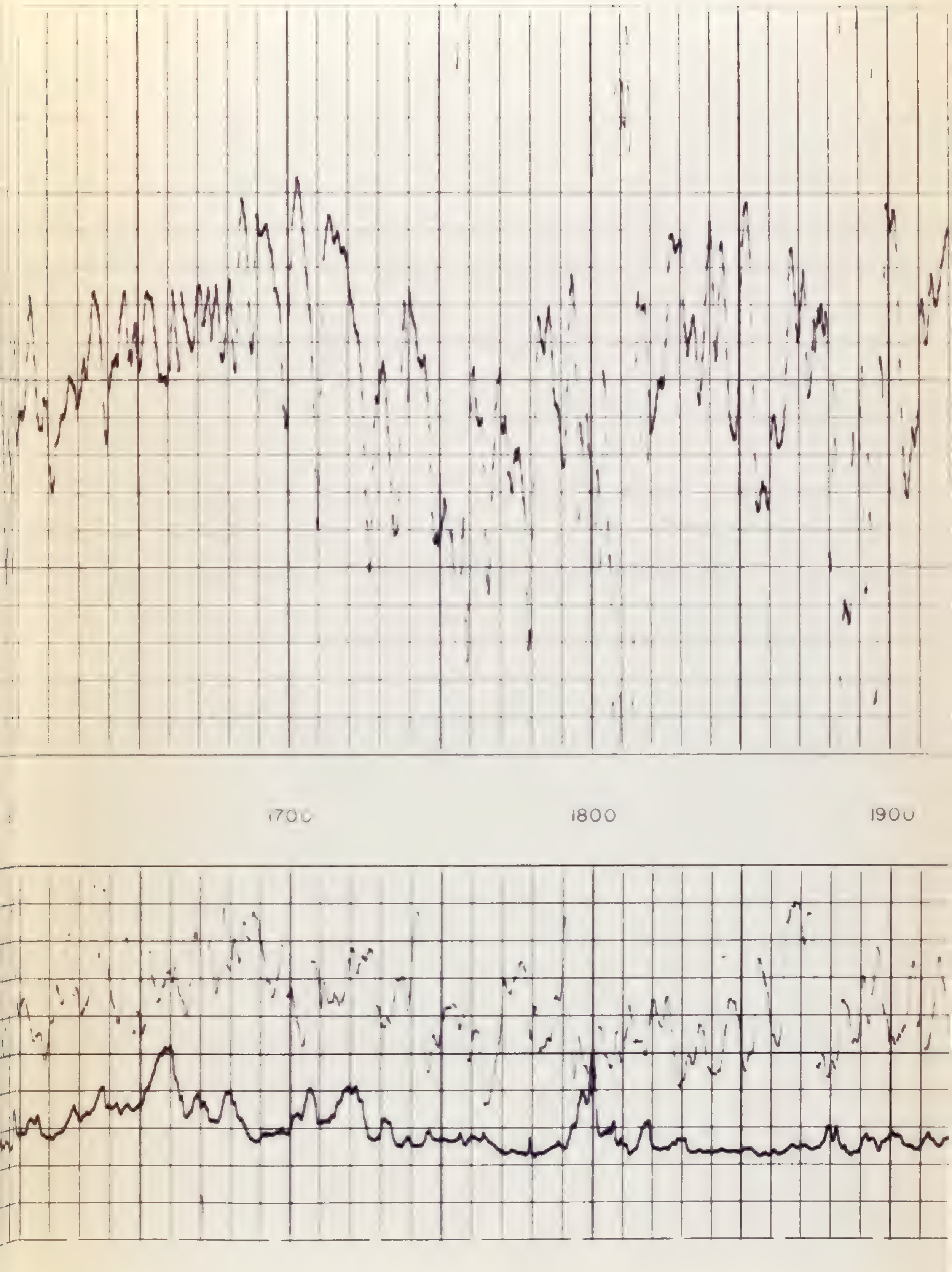

GR
Caliper
100
200
300


ΔT
400
500
600


700
800
900
000


1000
1100
1200
13


1400
1500
1600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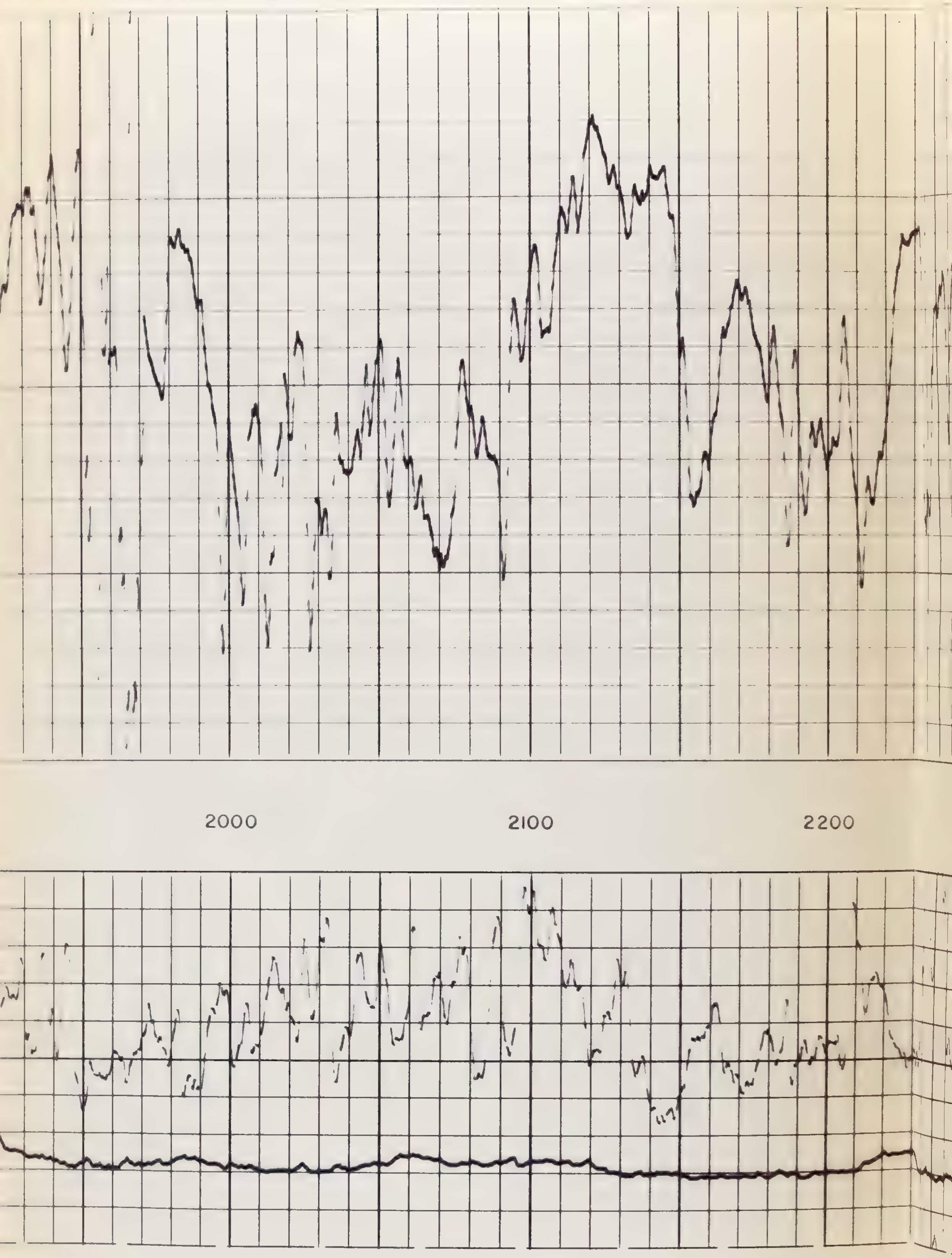
1800
1900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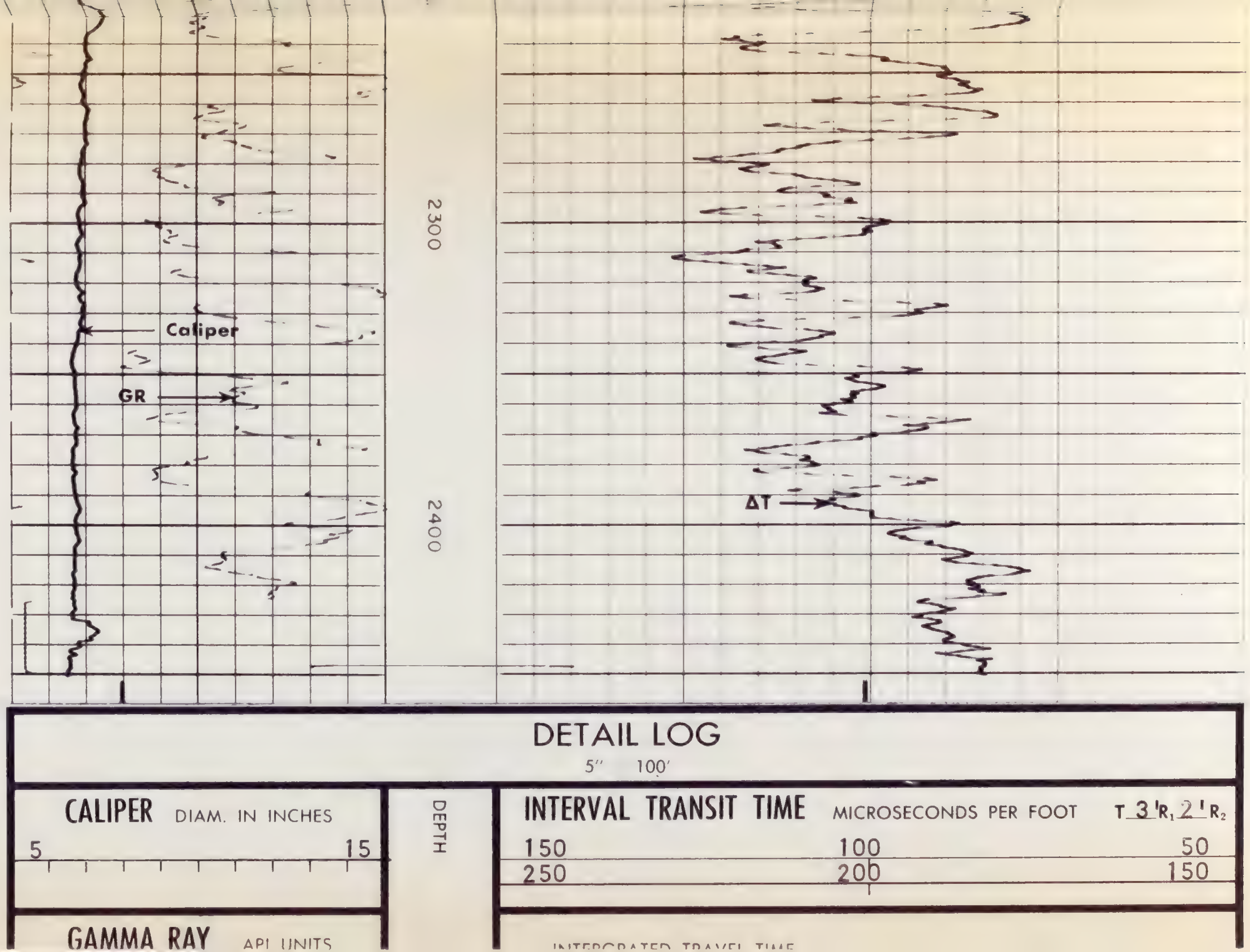
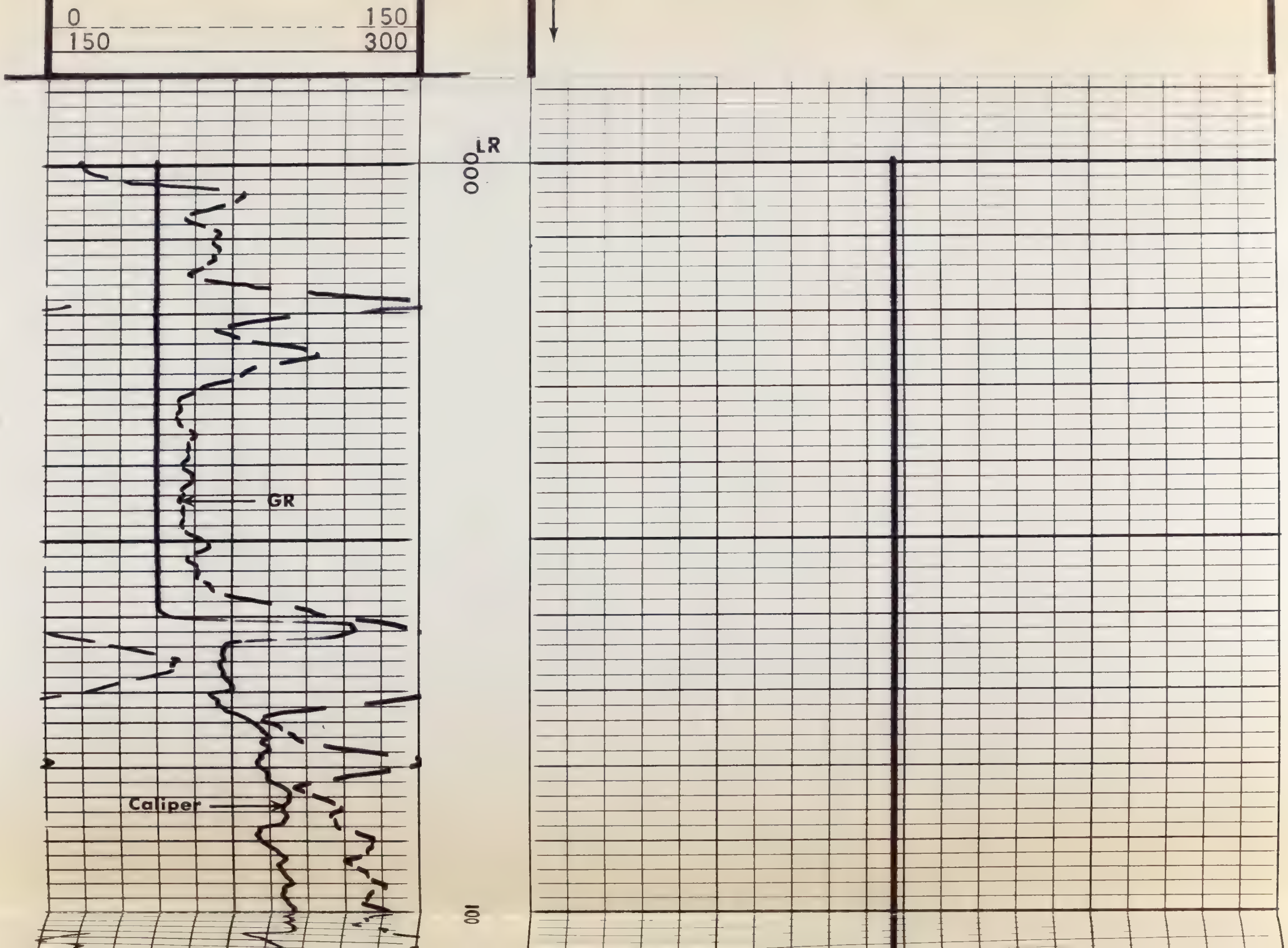
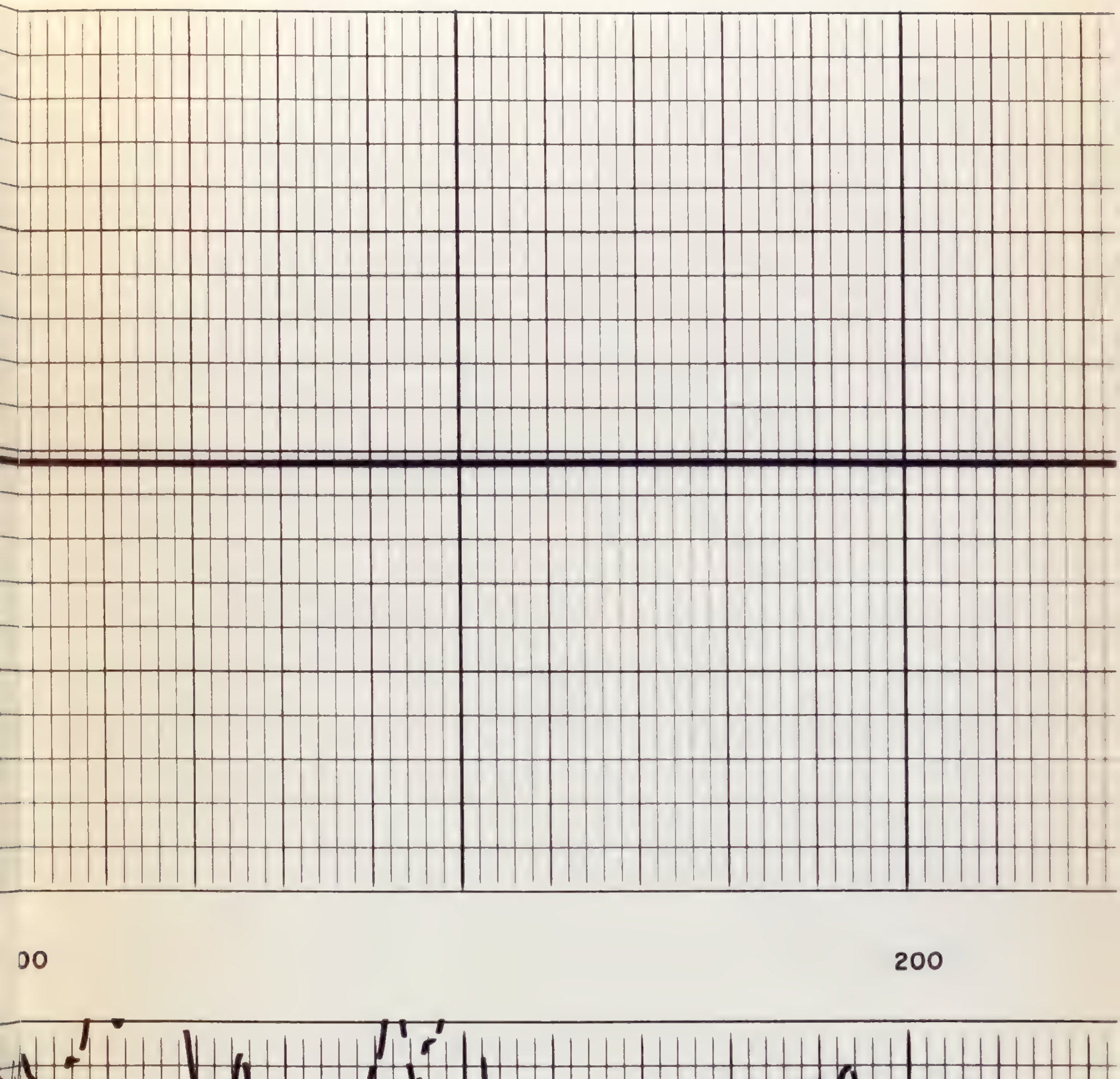
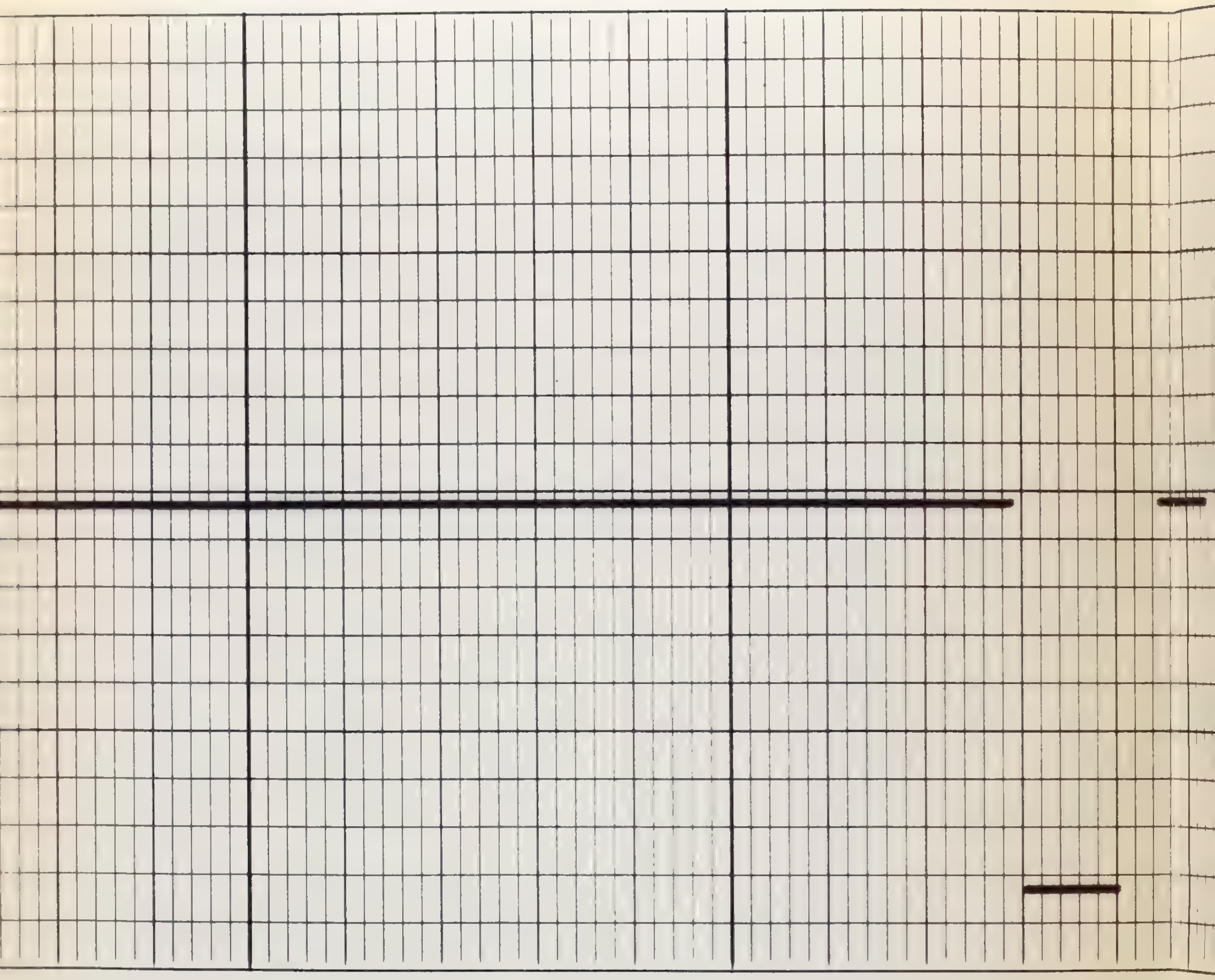
2100
2200


Caliper
GR
ΔT
2300
2400
DETAIL LOG
5″ 100′
CALIPER DIAM. IN INCHES
5
15
DEPTH
INTERVAL TRANSIT TIME MICROSECONDS PER FOOT
T 3′R₁ 2′R₂
150
100
50
250
200
150
GAMMA RAY API UNITS
INTEGRATED TRAVEL TIME


0
150
150
300
LR
000
GR
Caliper
100


00
200



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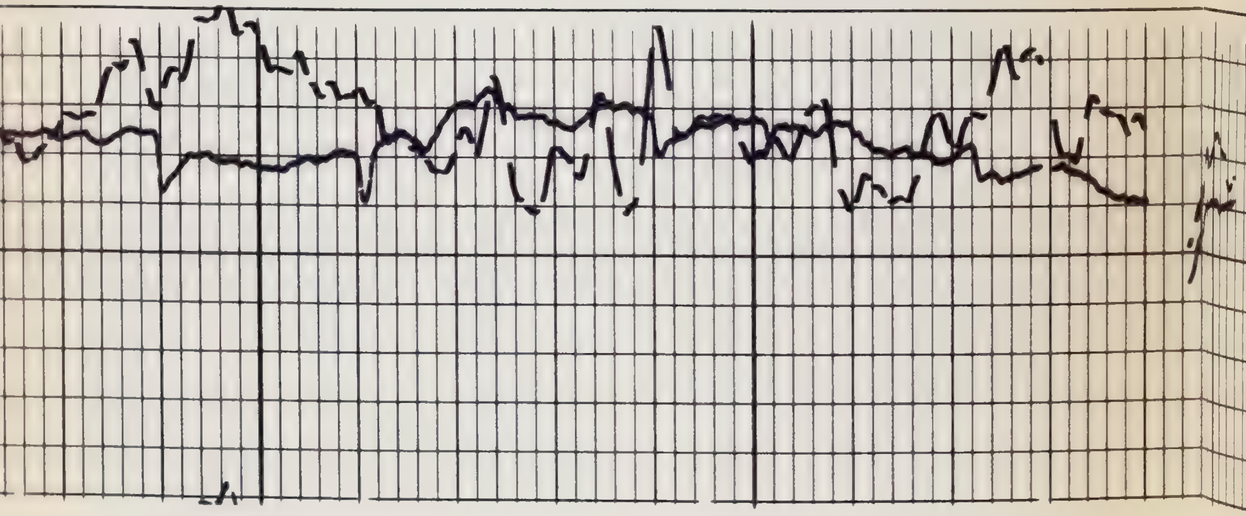

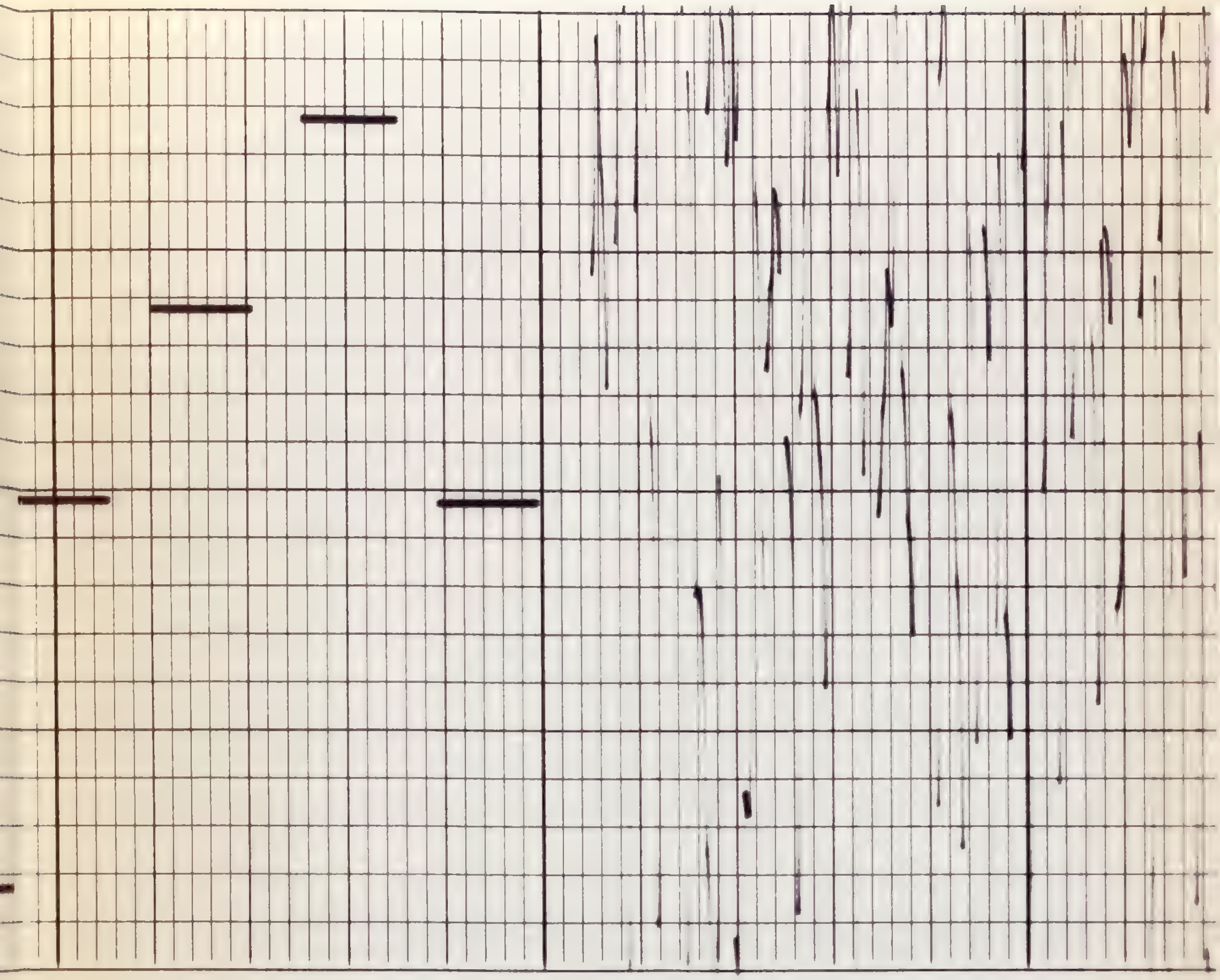

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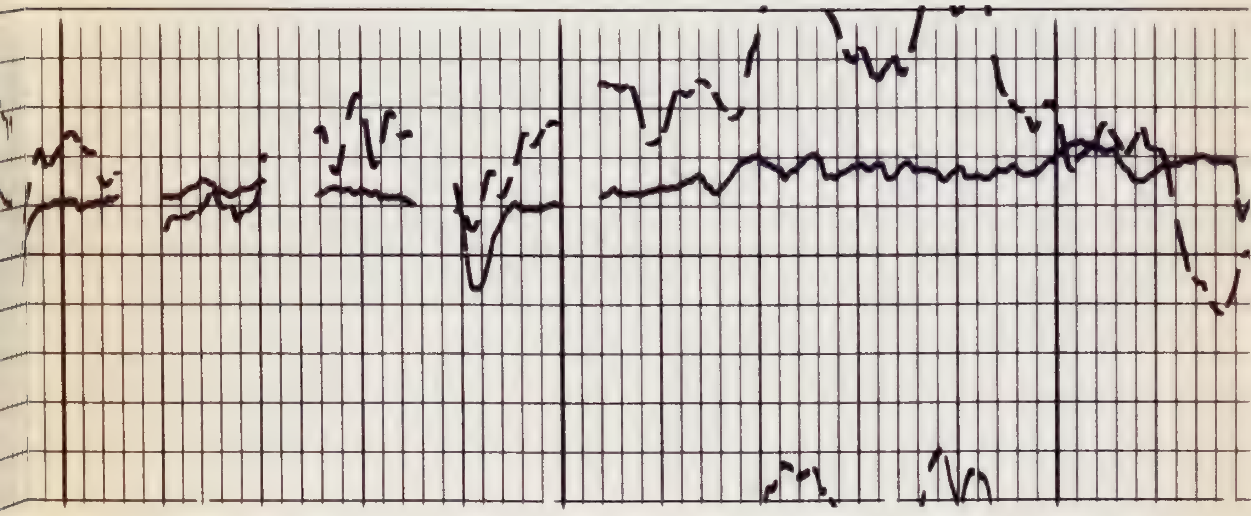
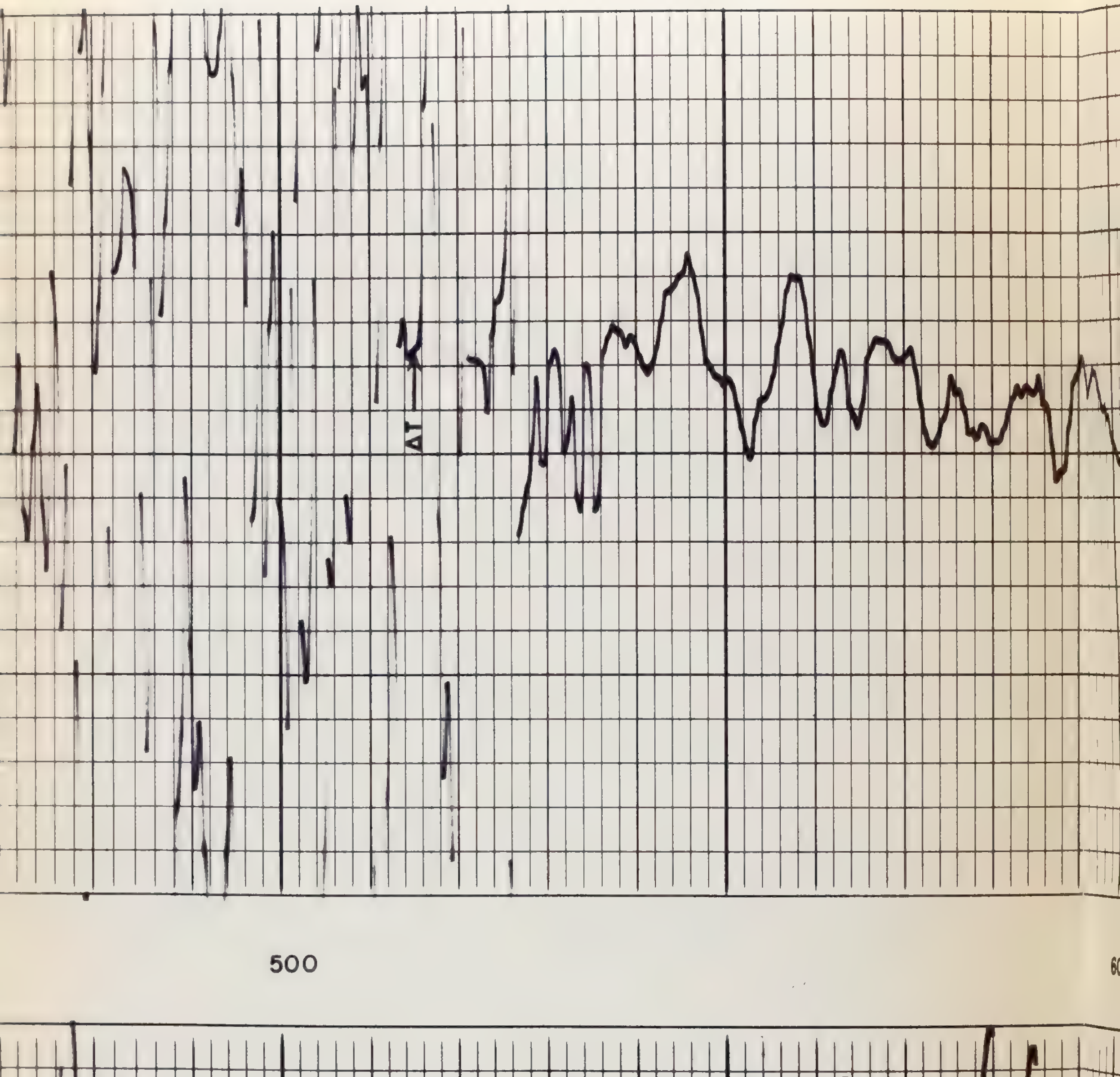
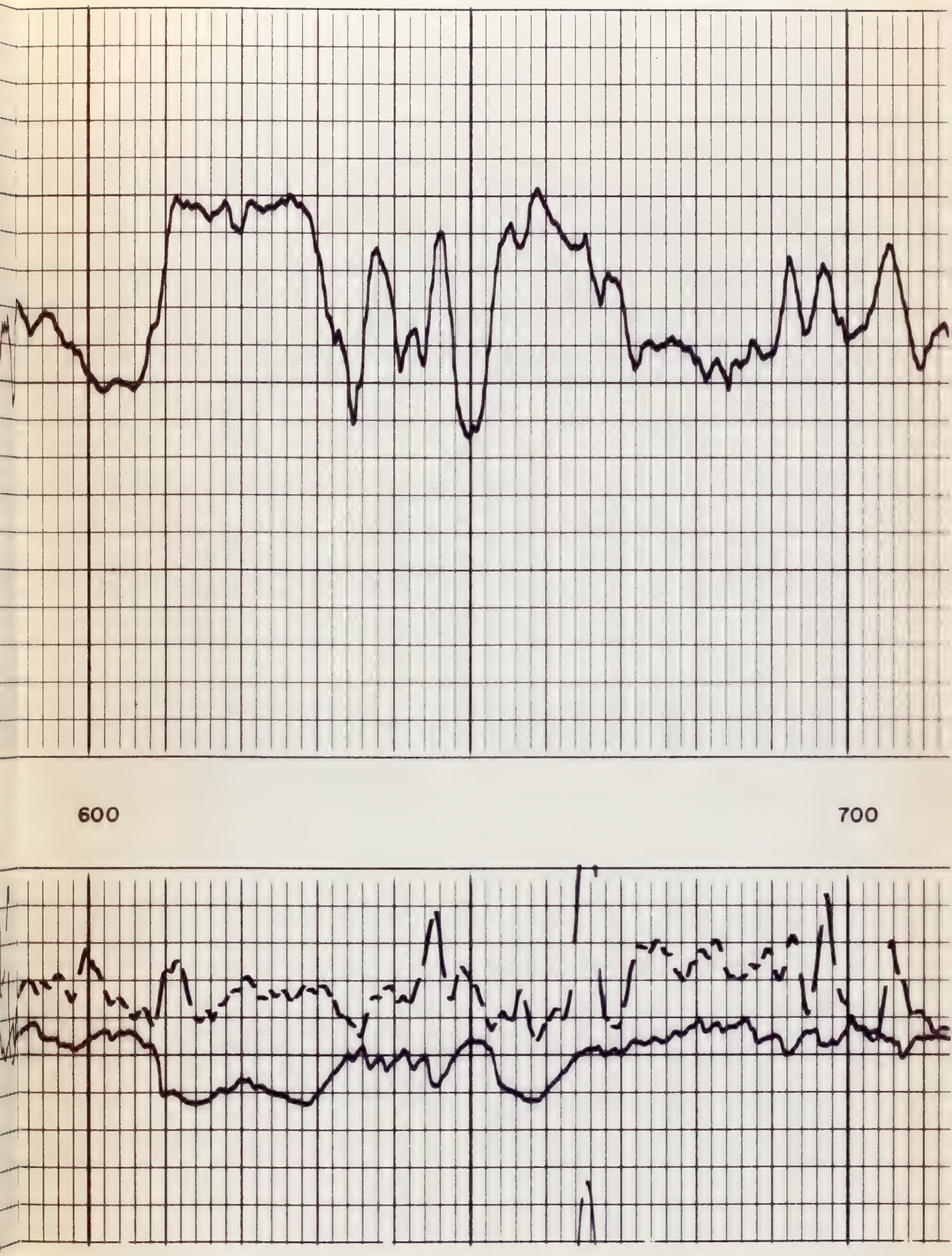
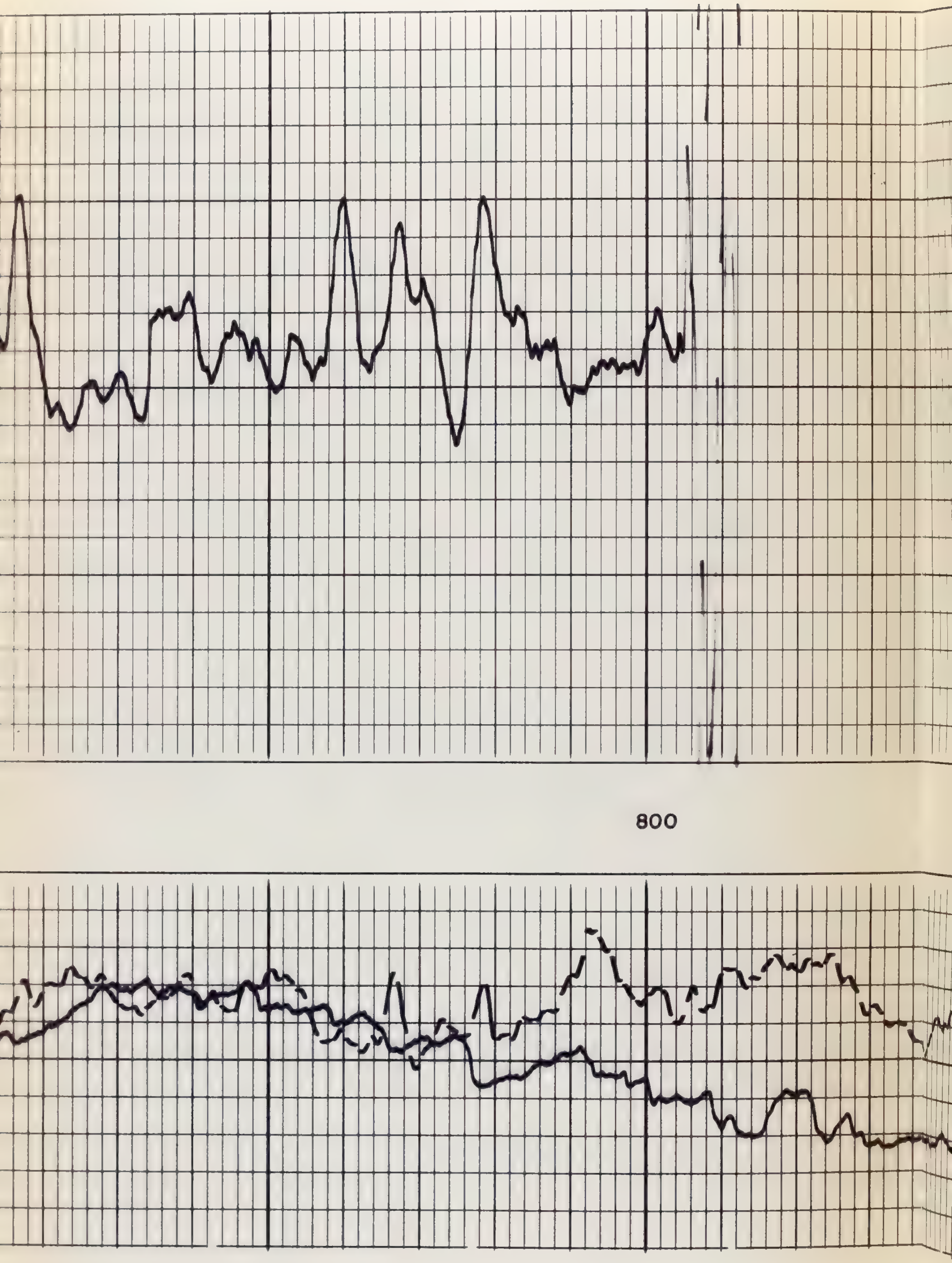



ΔT
500
60


600
700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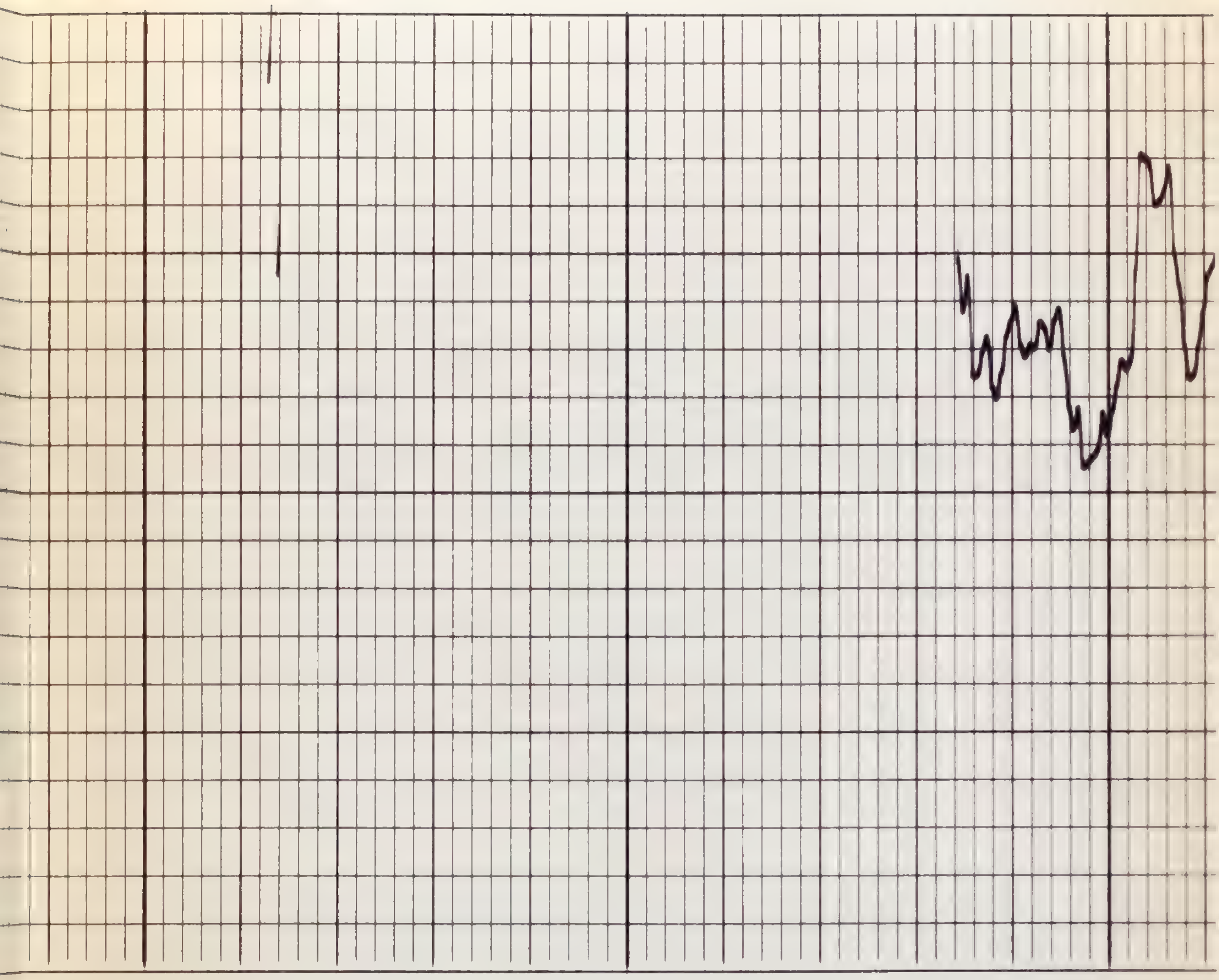

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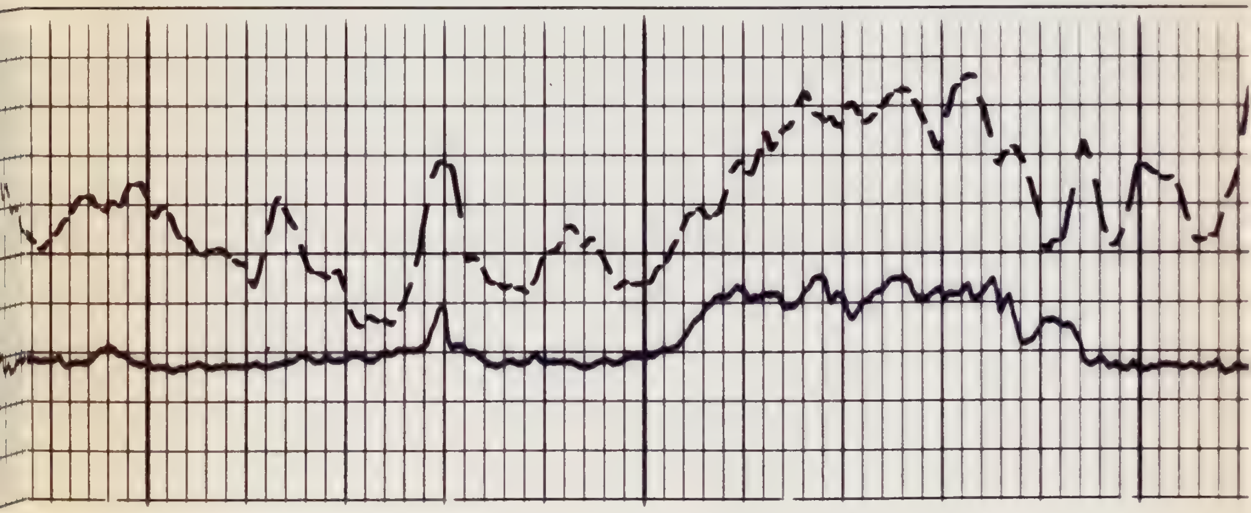
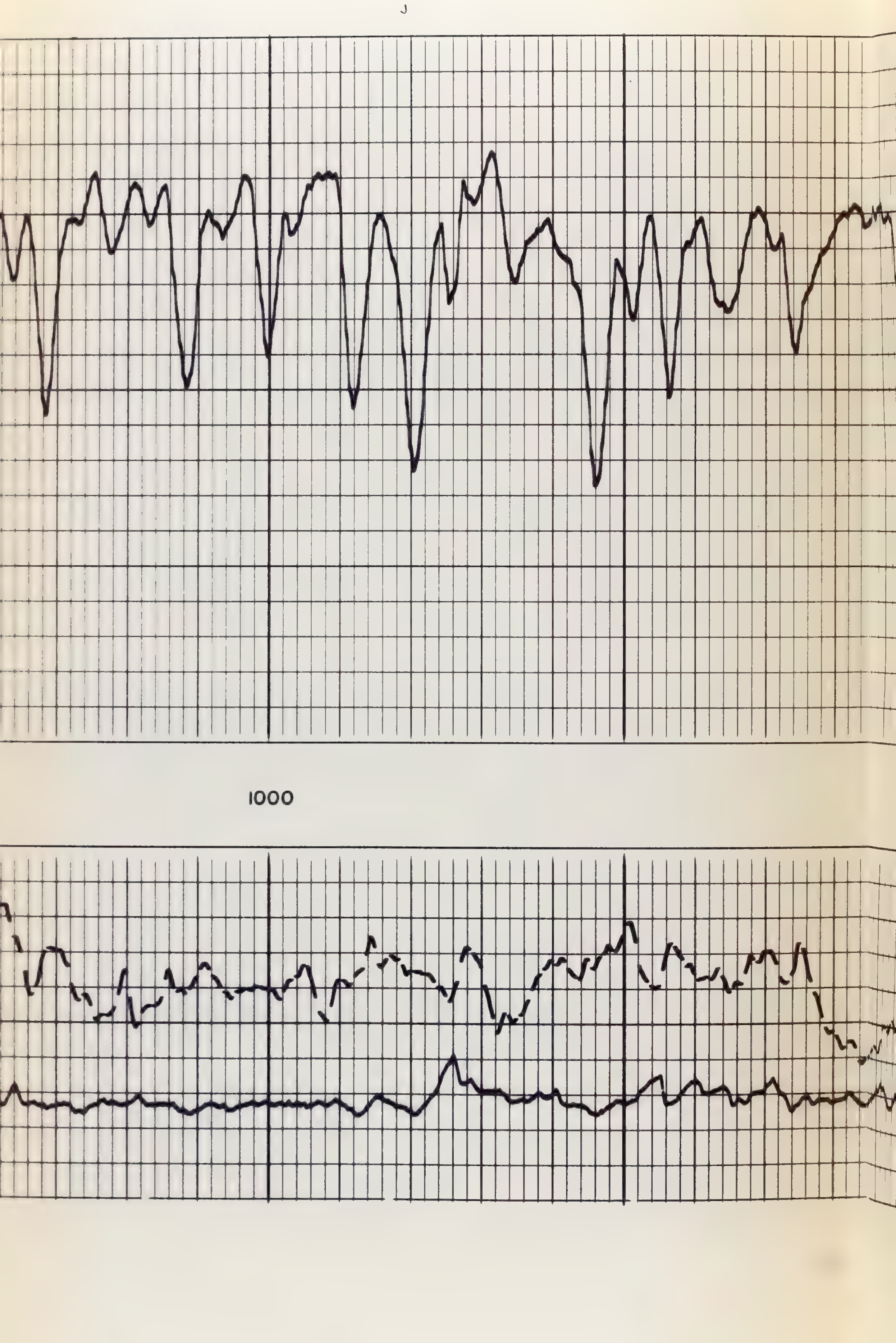
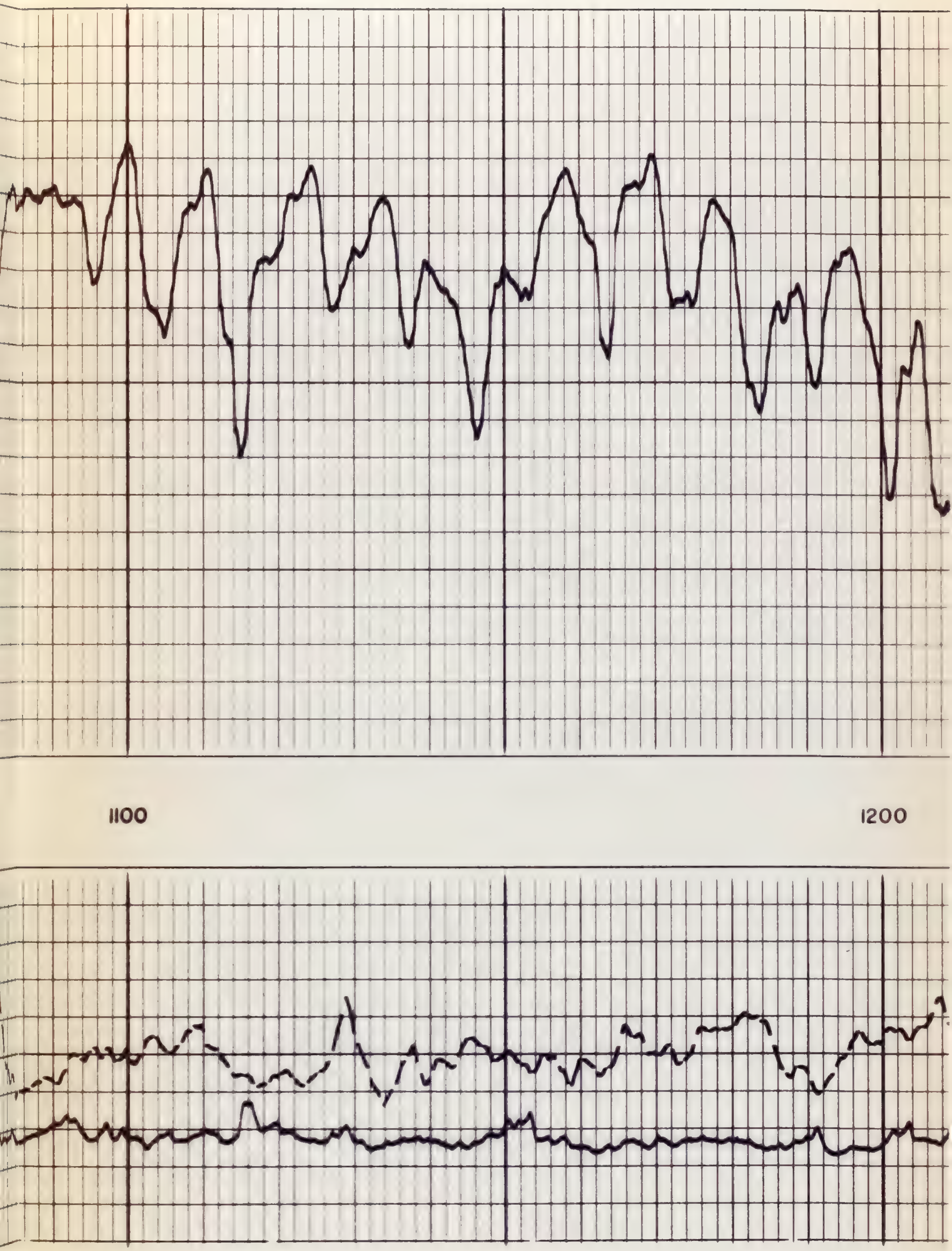
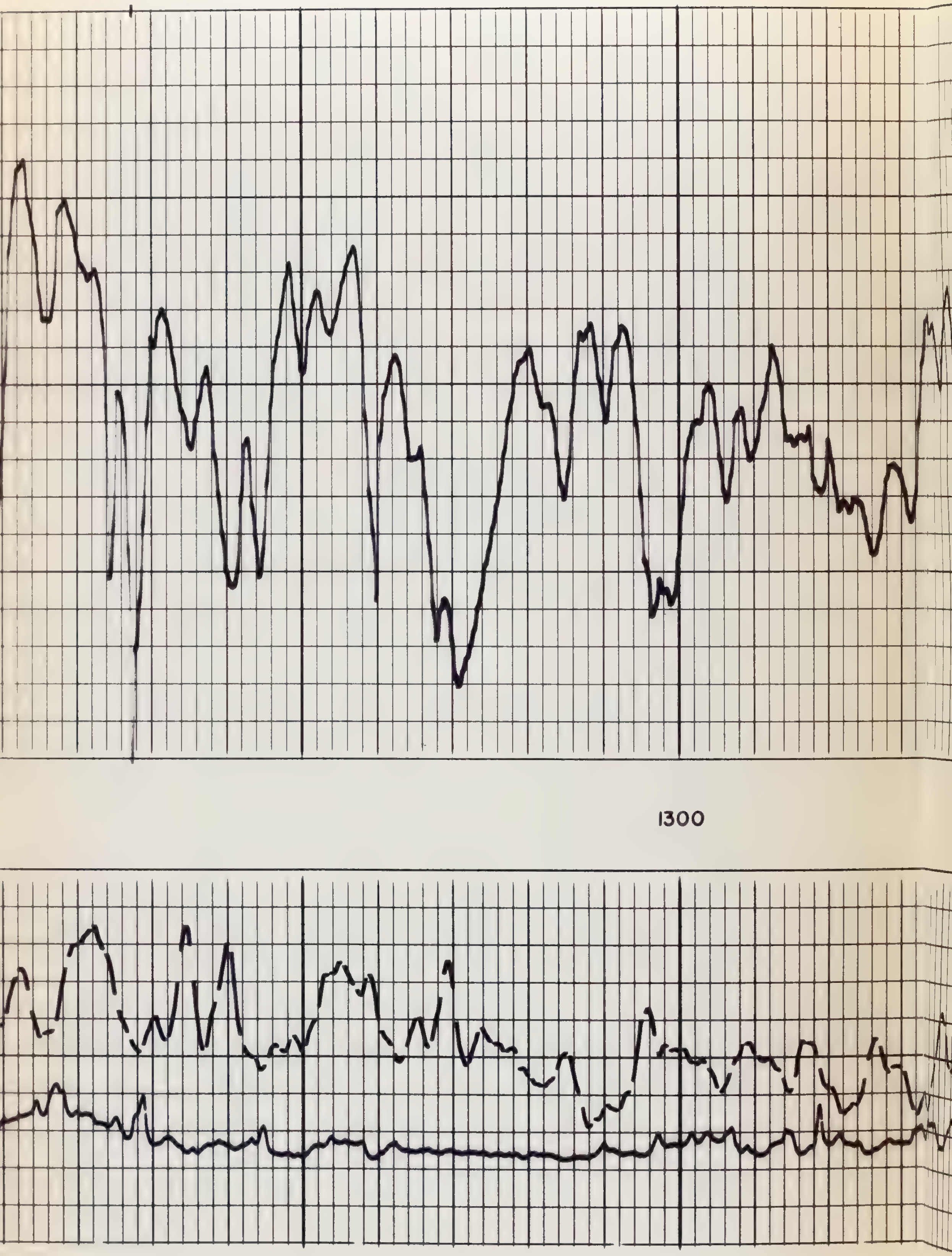



J
1000


1100
1200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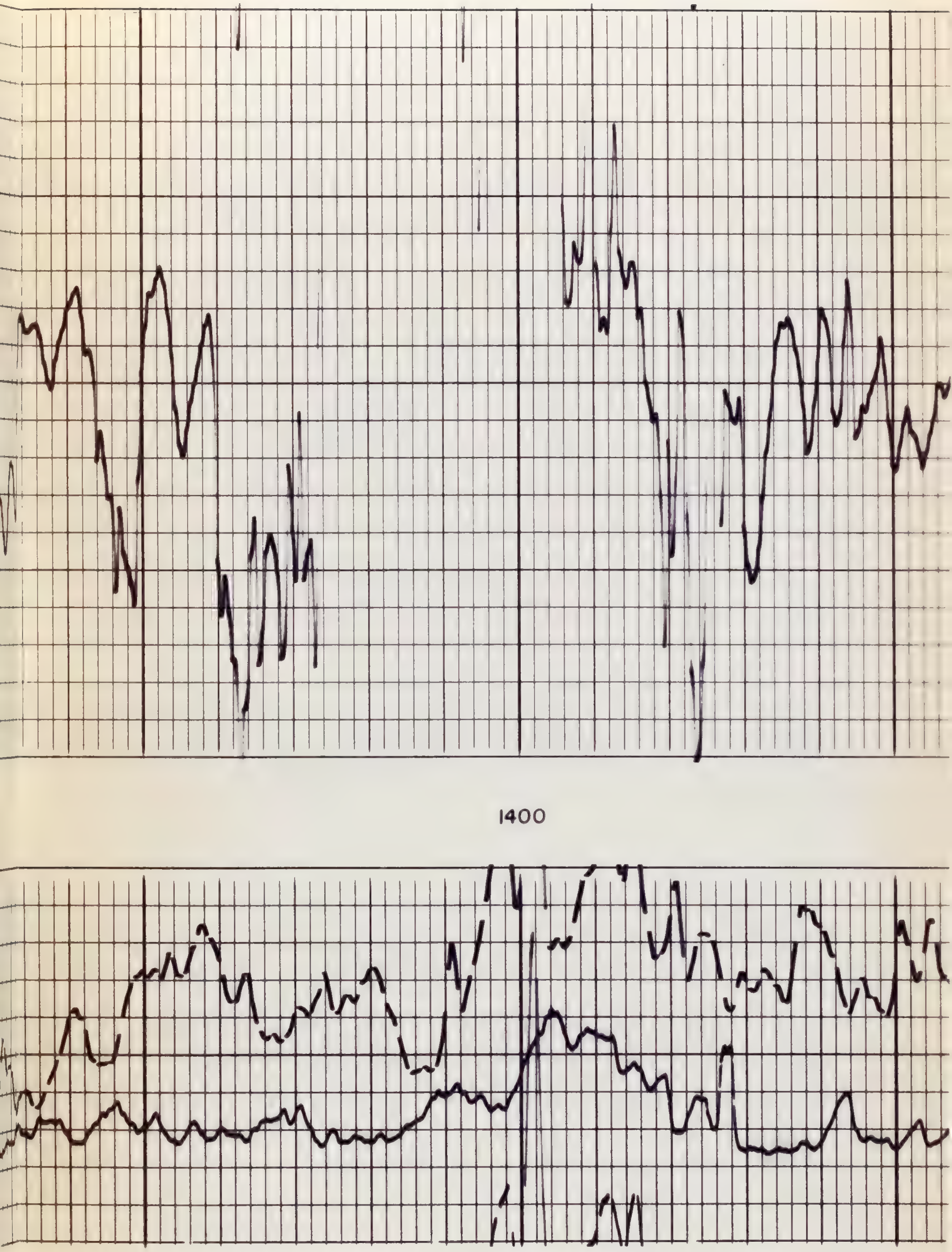
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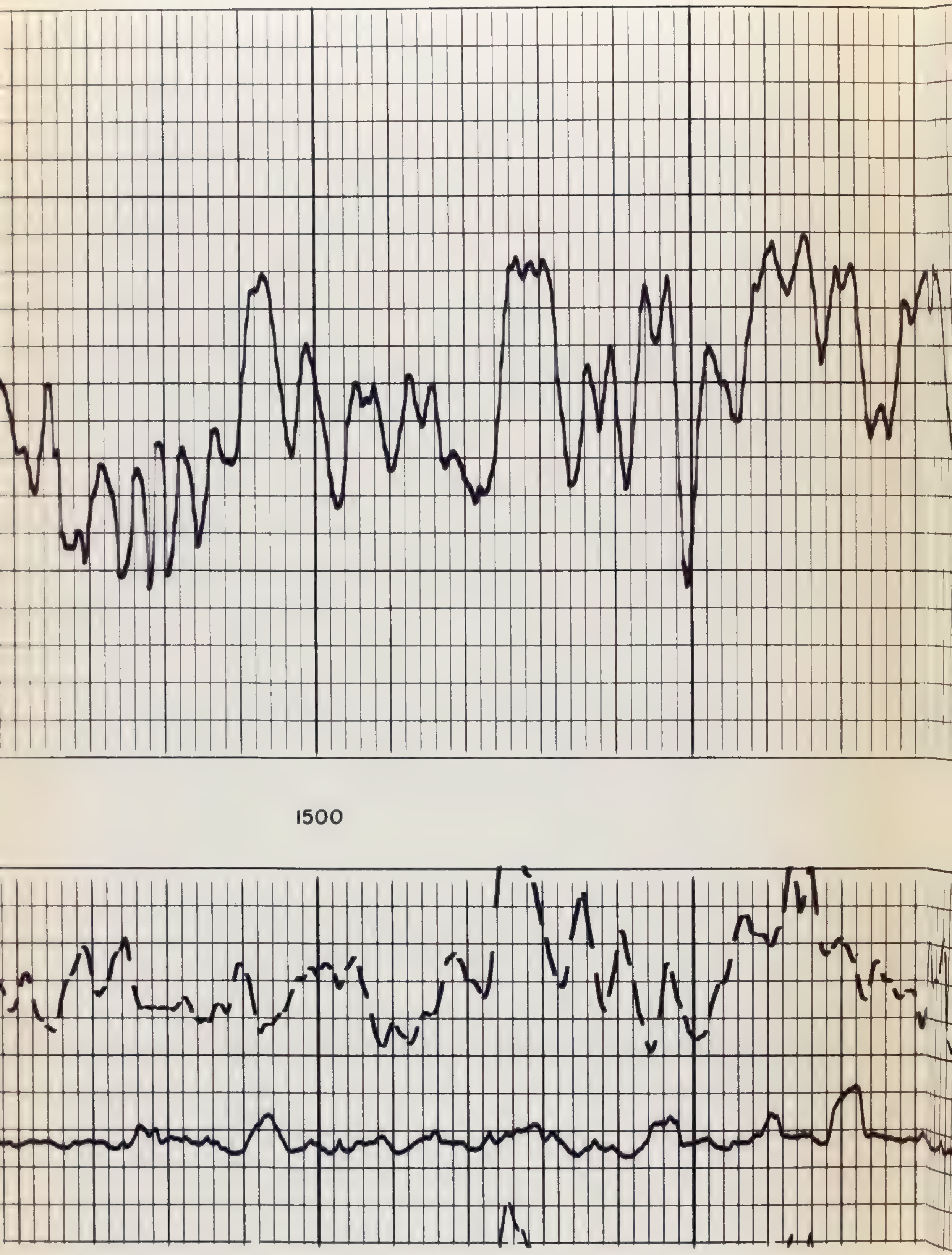
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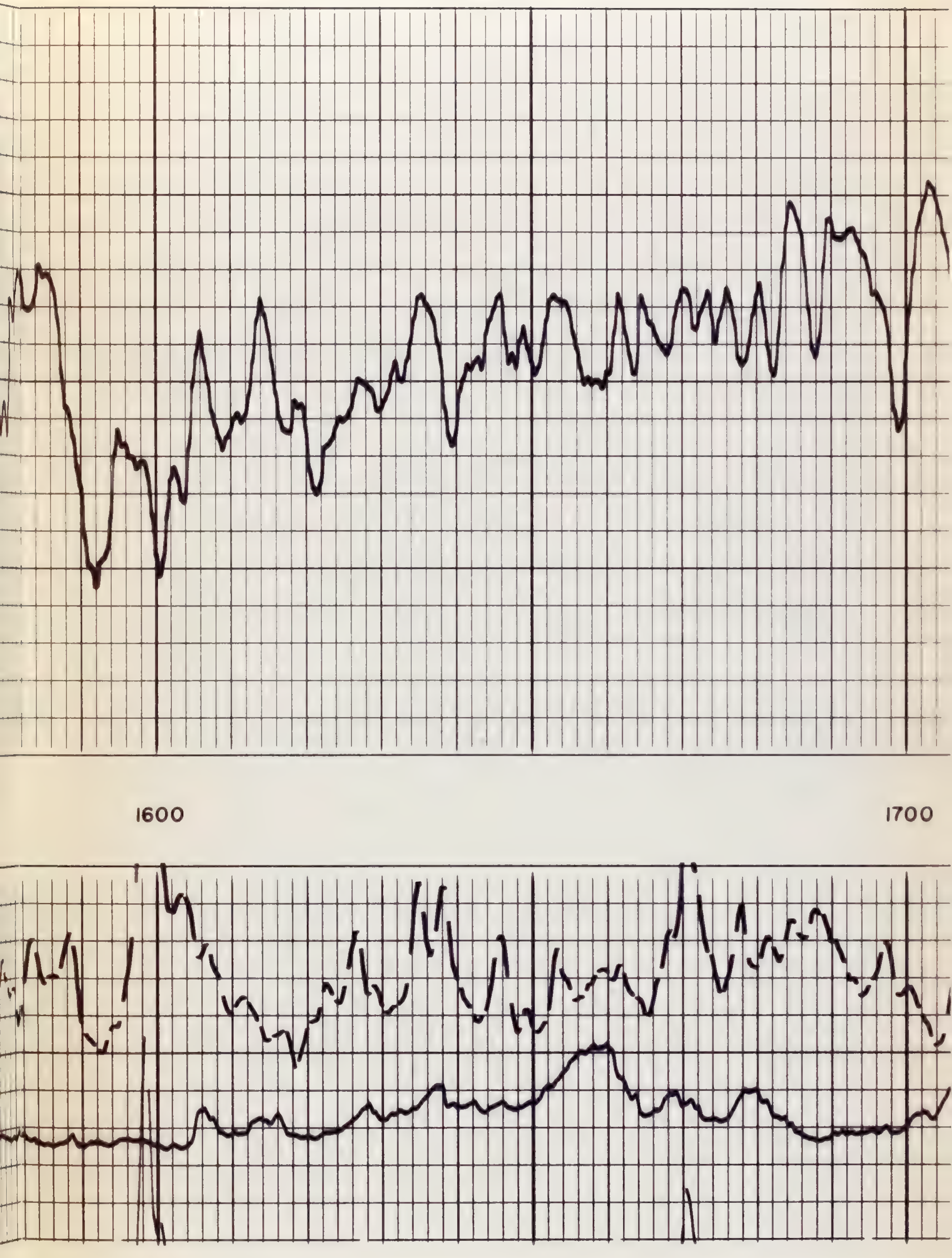
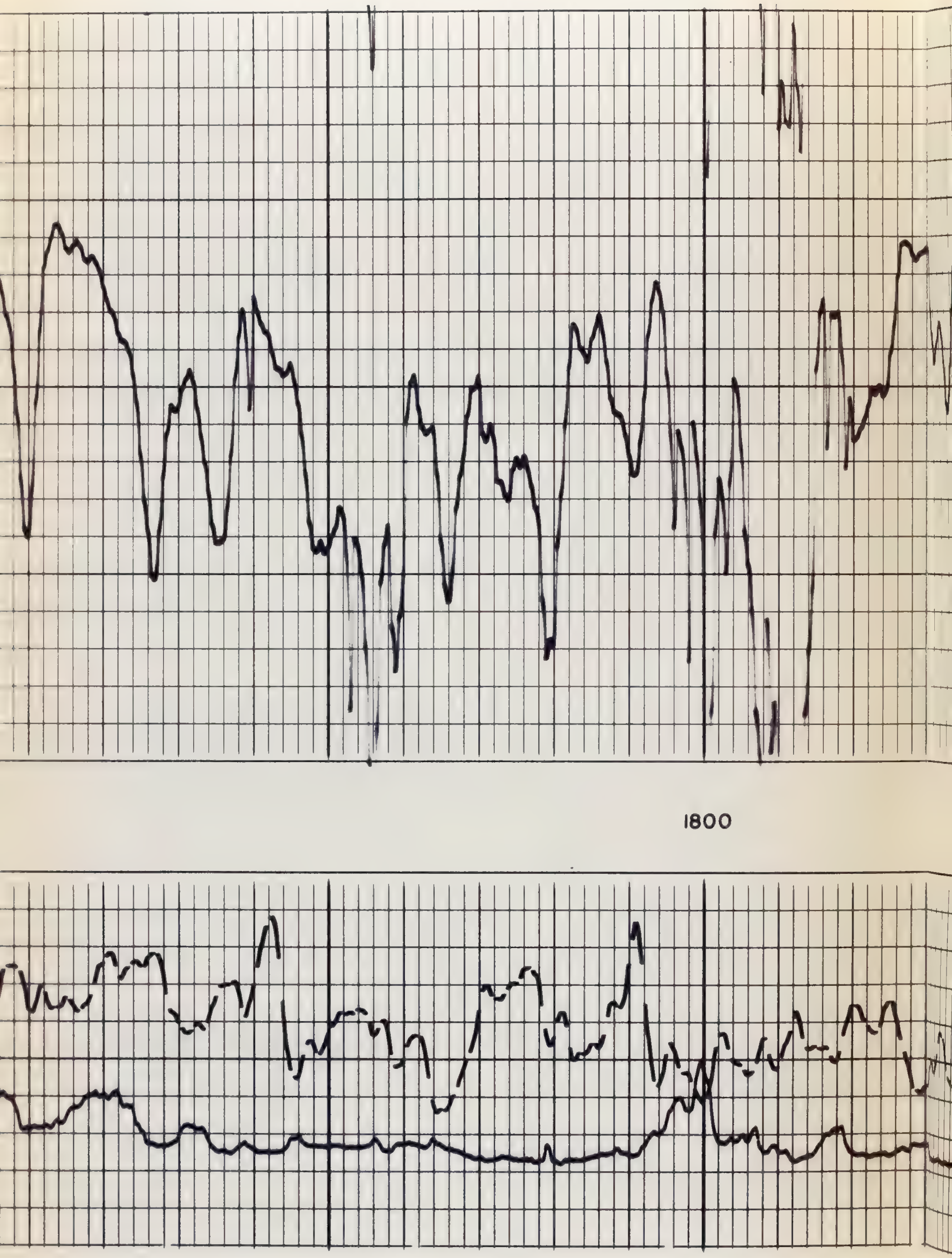

1600
1700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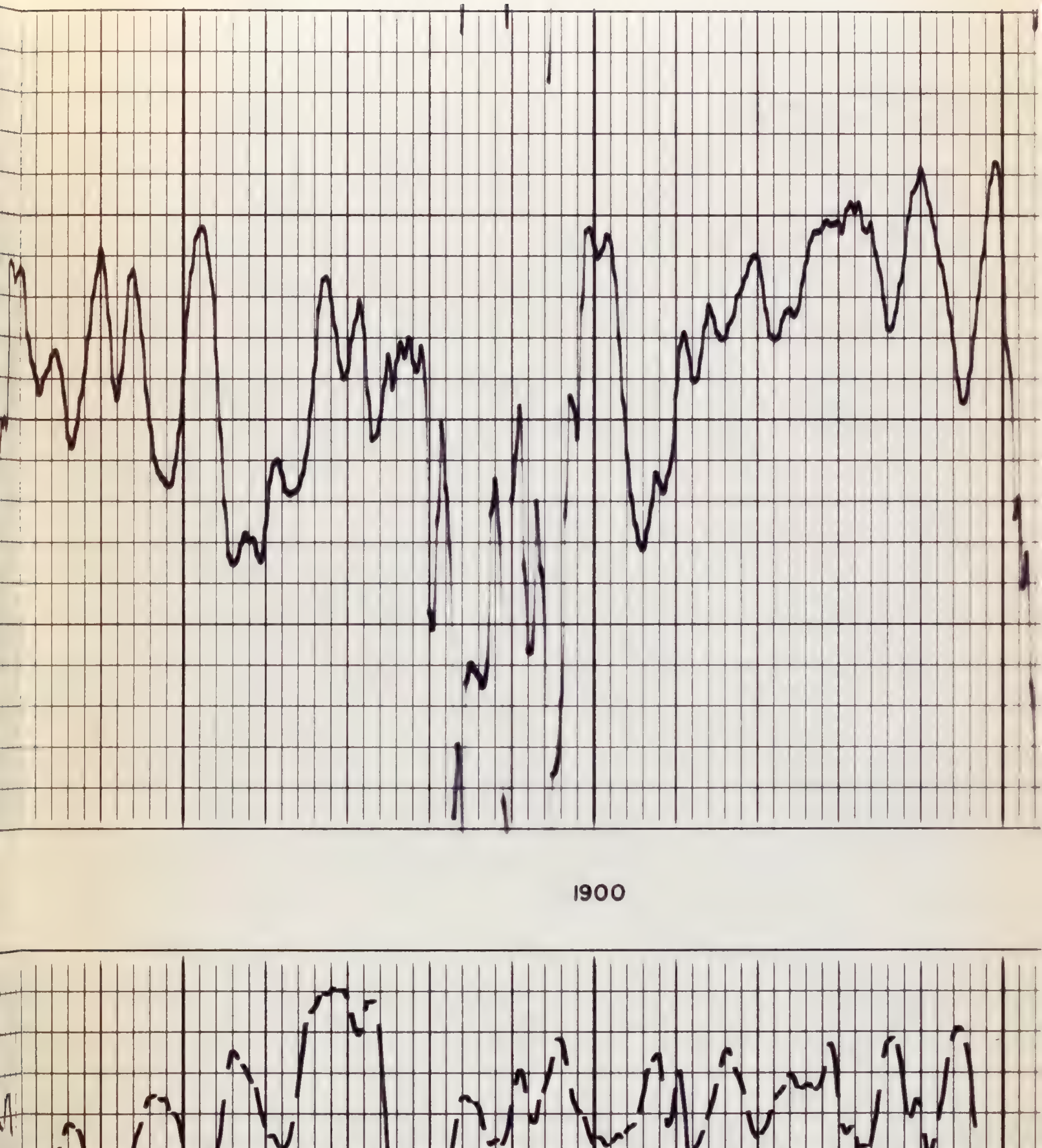
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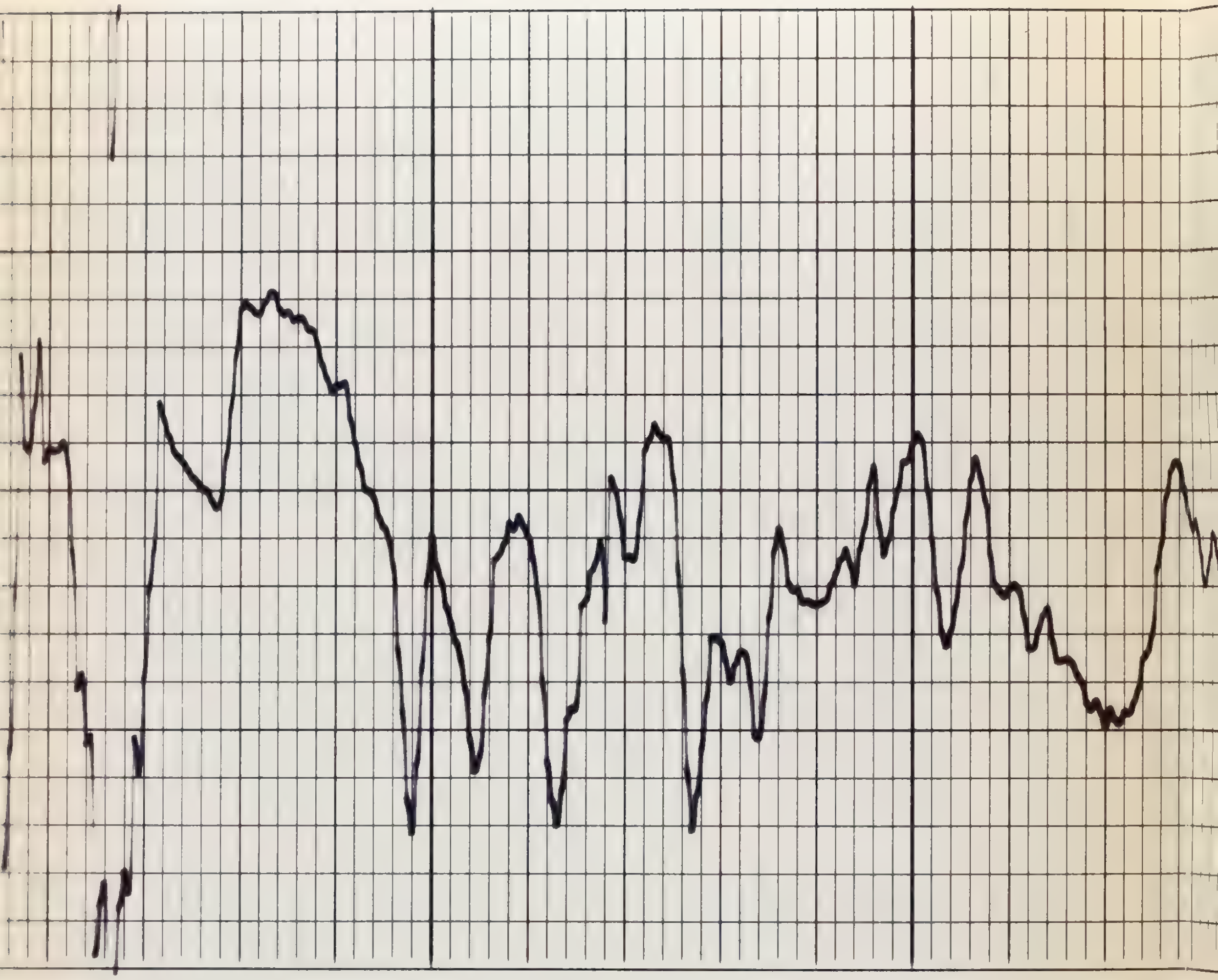

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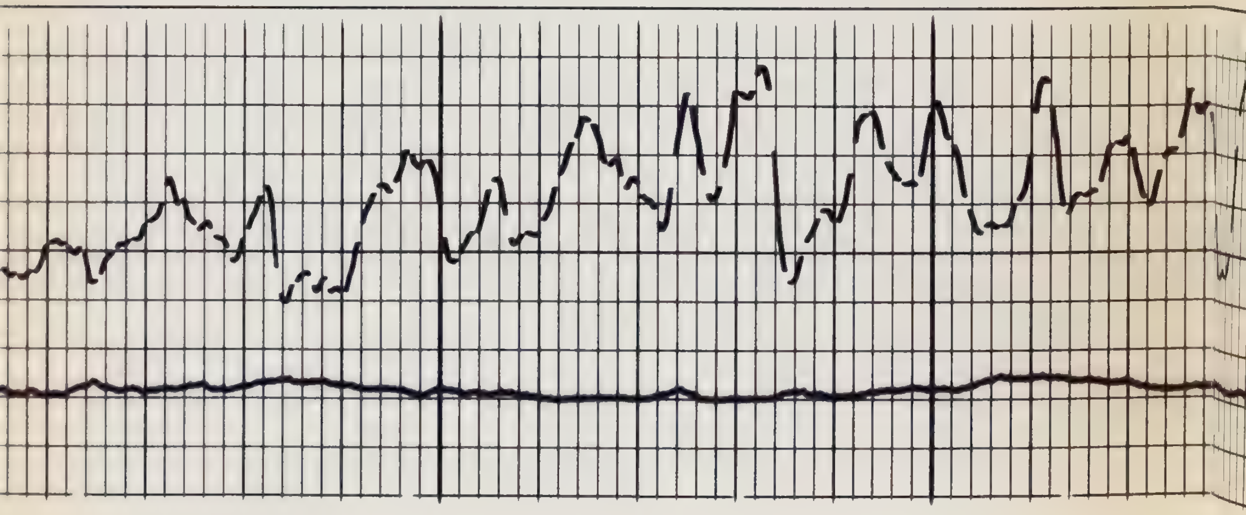

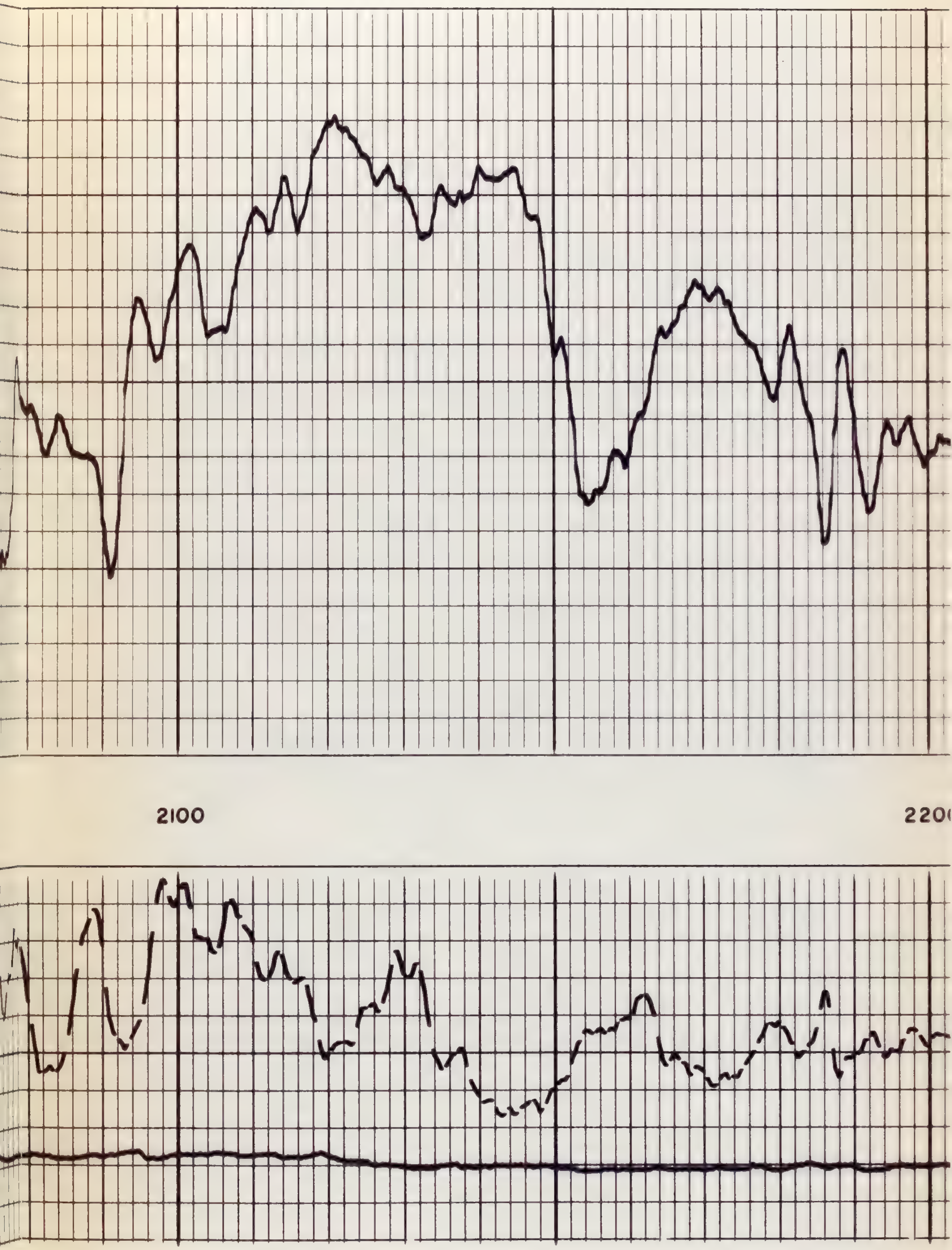
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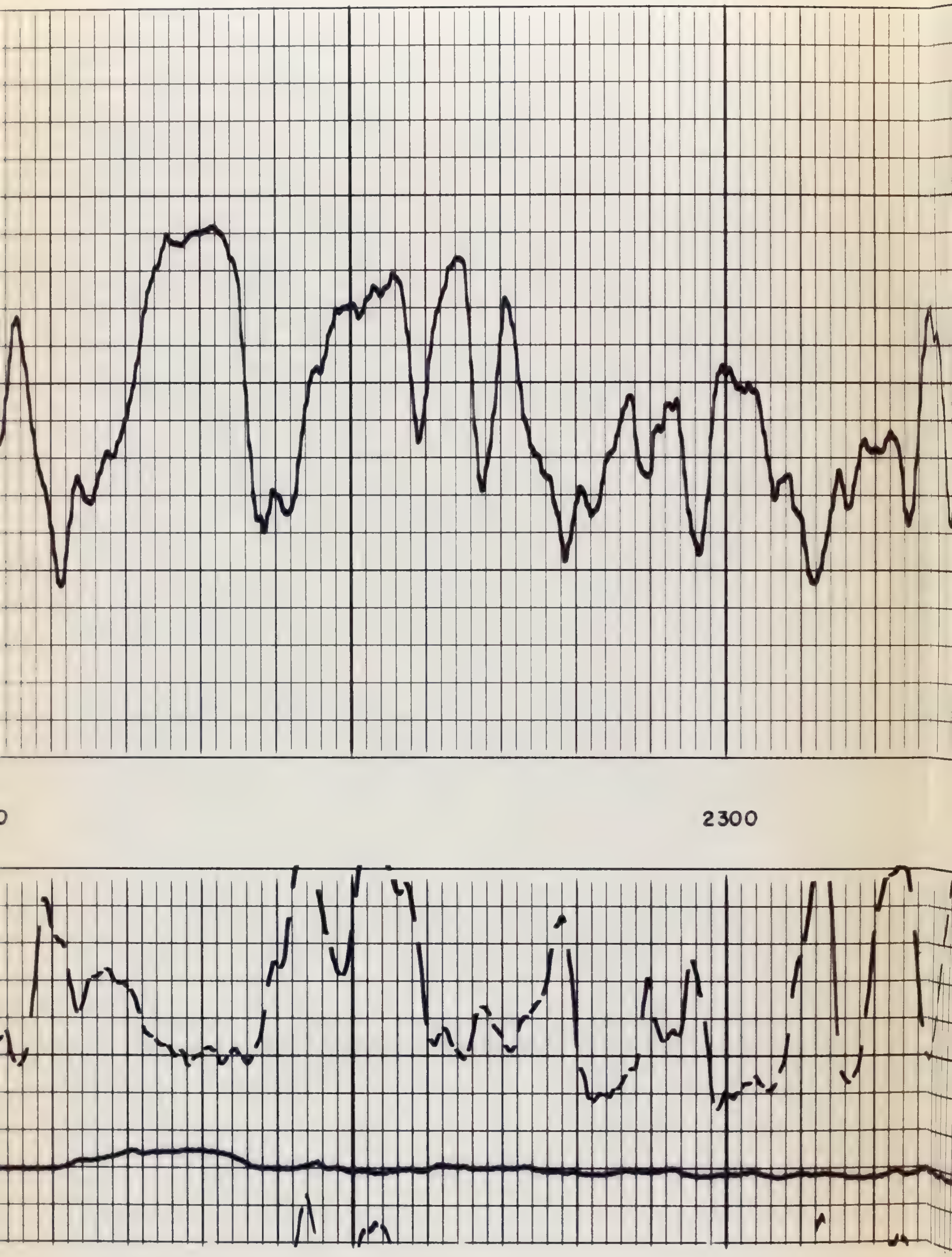
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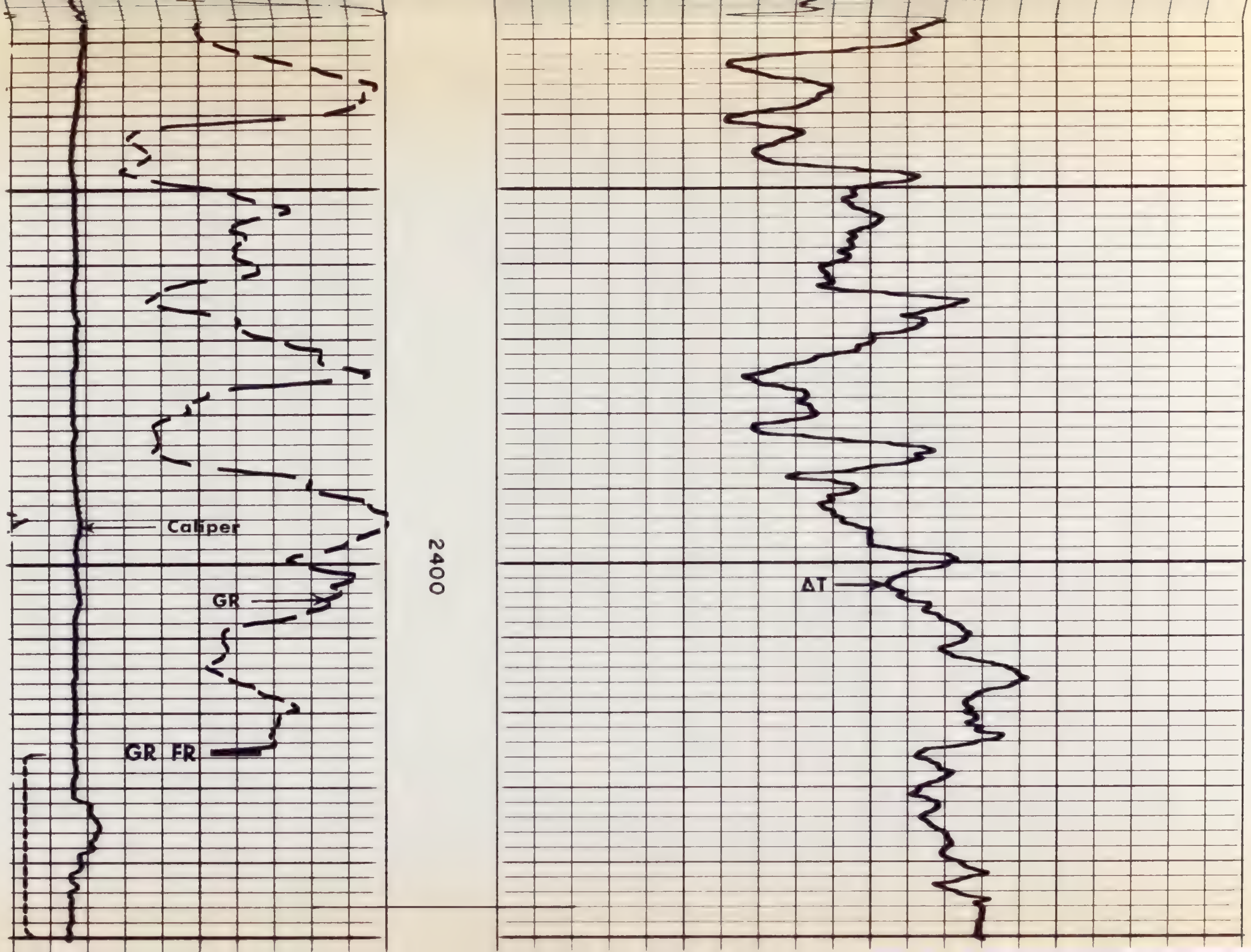
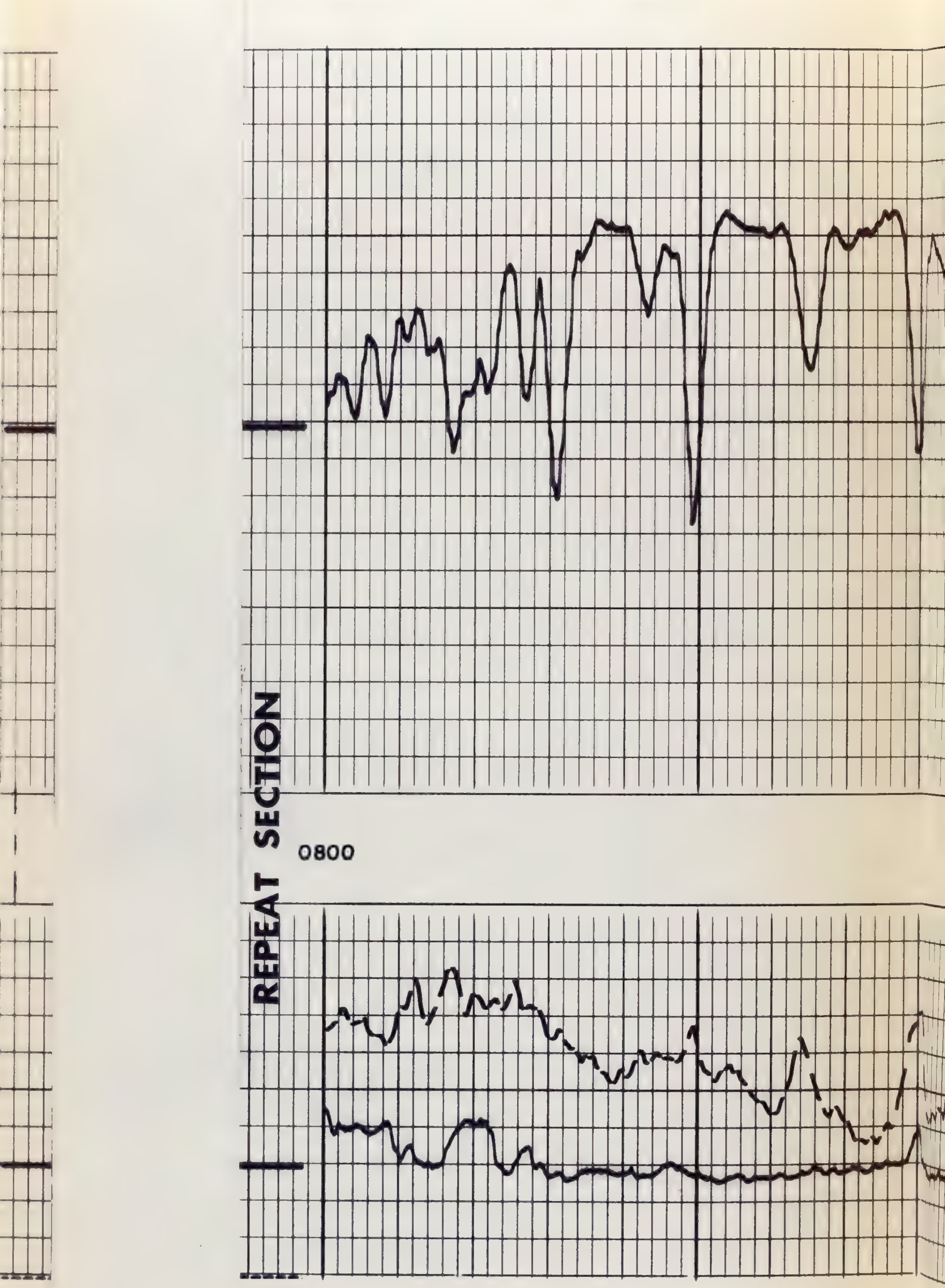
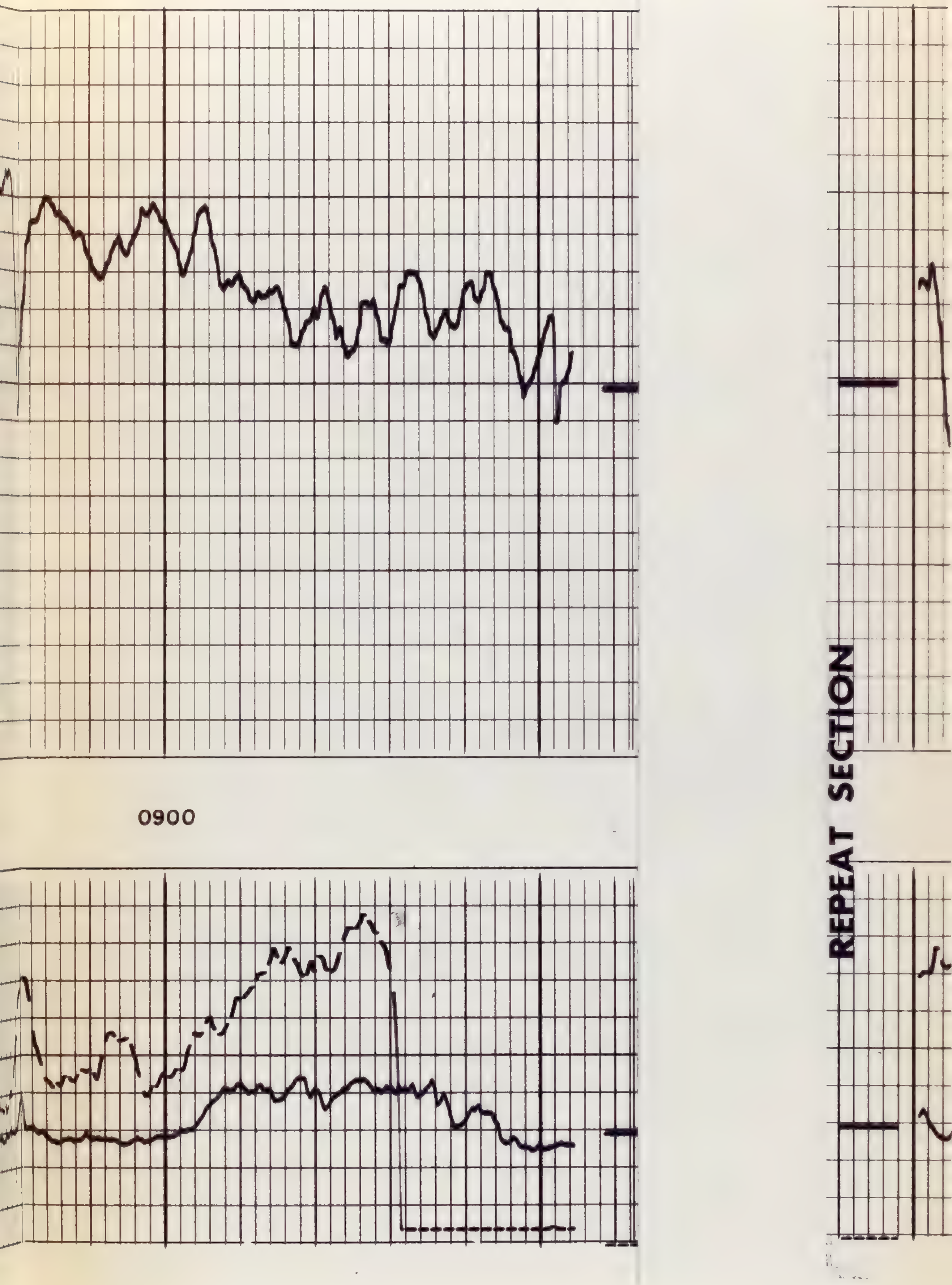
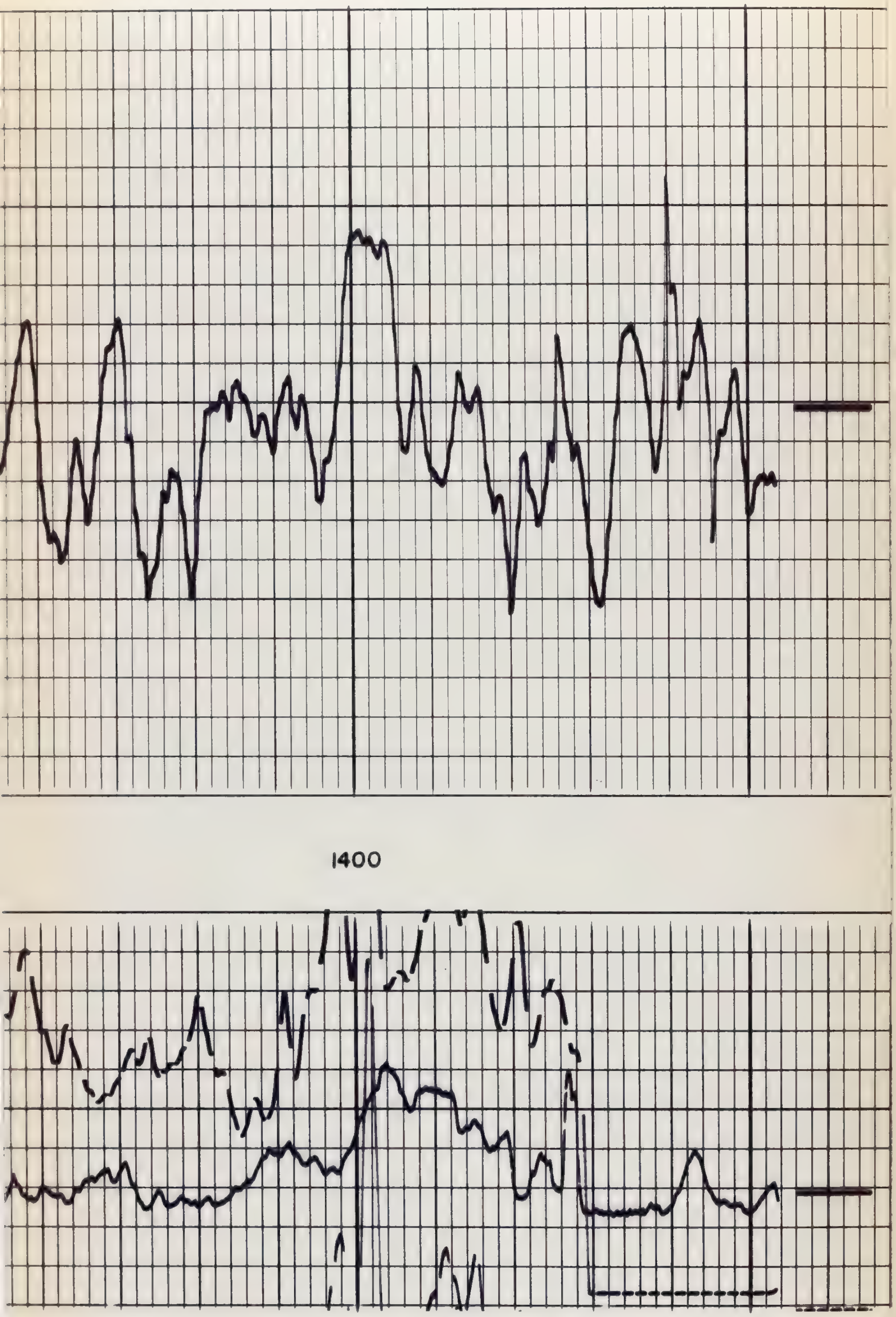

Caliper
GR
GR FR
2400
ΔT


REPEAT SECTION
0800


0900
REPEAT SECTION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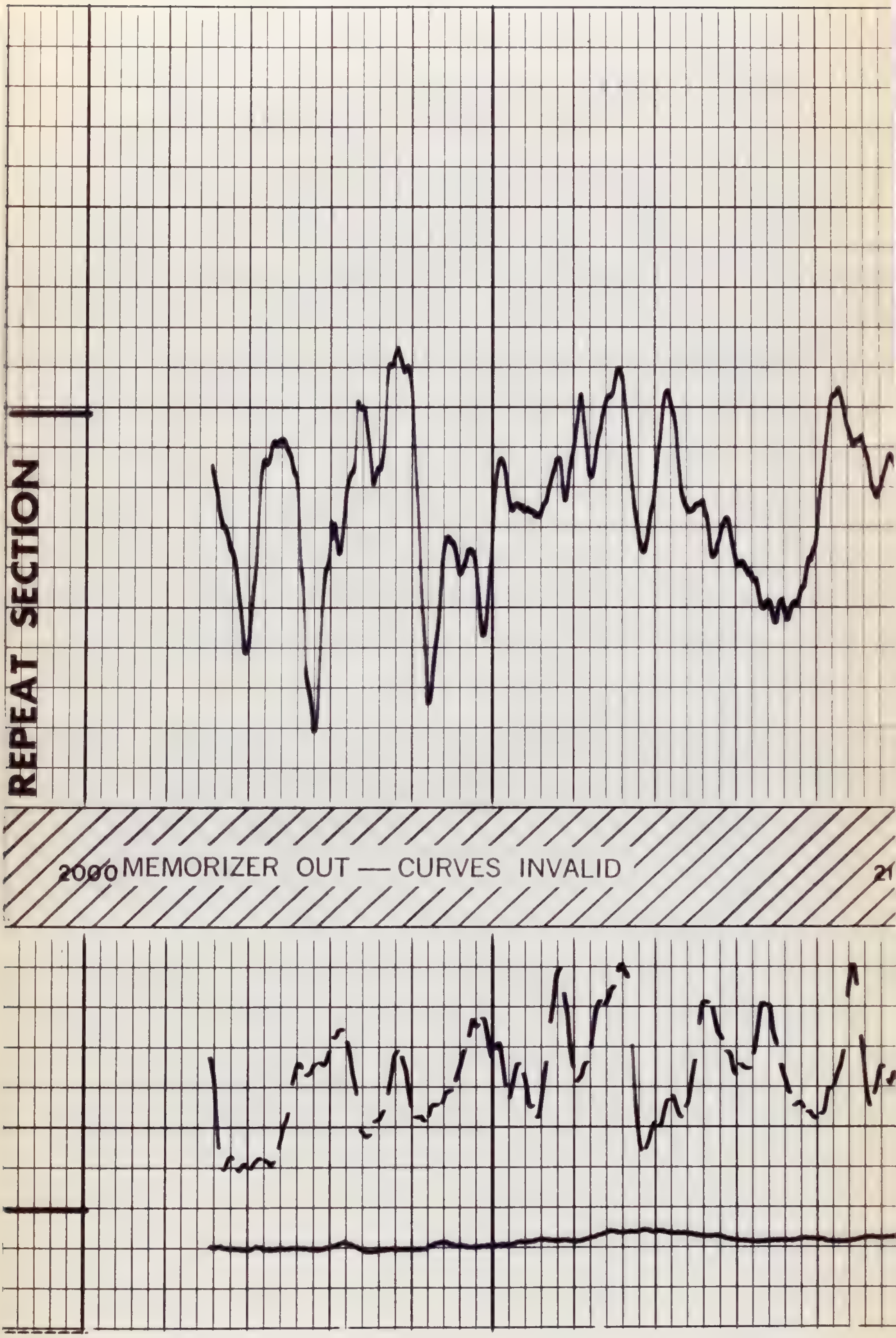
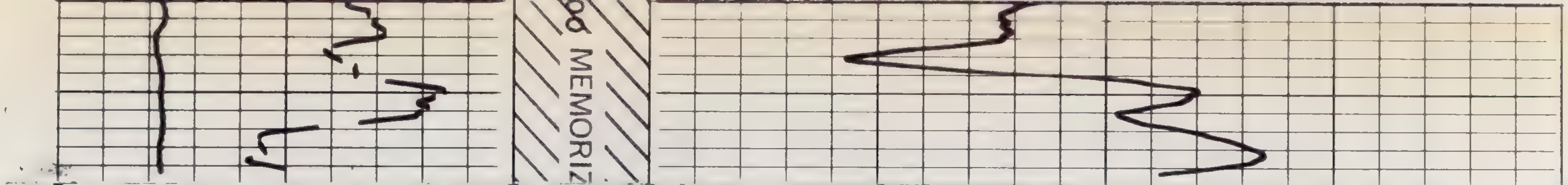

REPEAT SECTION
2000
MEMORIZER OUT — CURVES INVALID
21



GAMMA RAY API UNITS

0 150

150 300

CALIPER DIAM. IN INCHES

5 15

DEPTH

INTERGRATED TRAVEL TIME

INTERVAL TRANSIT TIME MICROSECONDS PER FOOT T 3' R₁ 2' R₂

150 100 50

200 150

WS-2231

TRANSIT TIME
MICROSECONDS 5' SPACING

600 400

800 600

AMPLITUDE MILLIVOLTS

0 20

VARIABLE DENSITY
MICROSECONDS

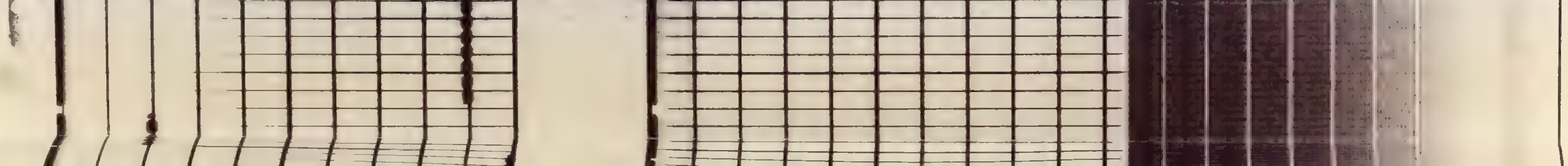
200 1200

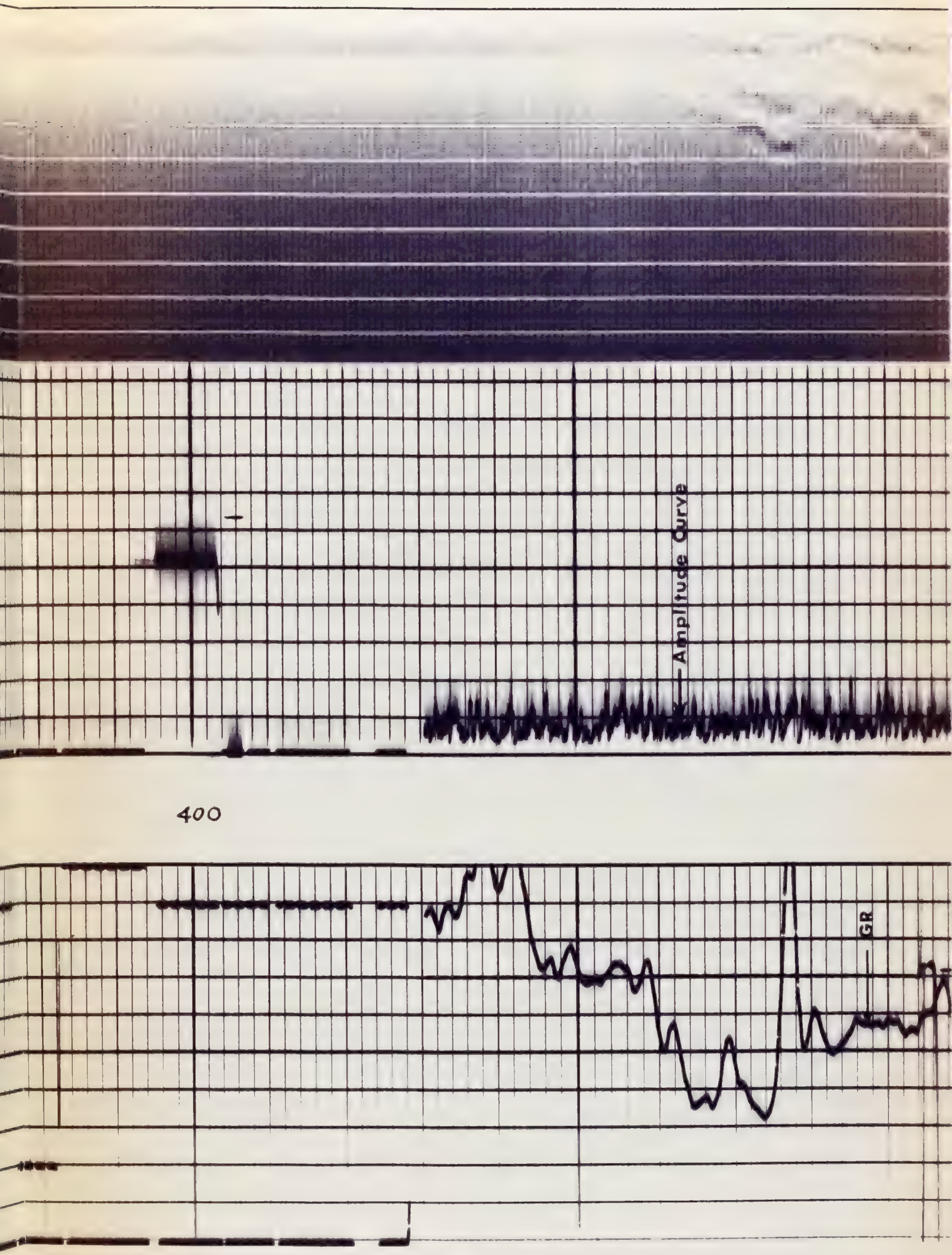
GAMMA RAY API UNITS

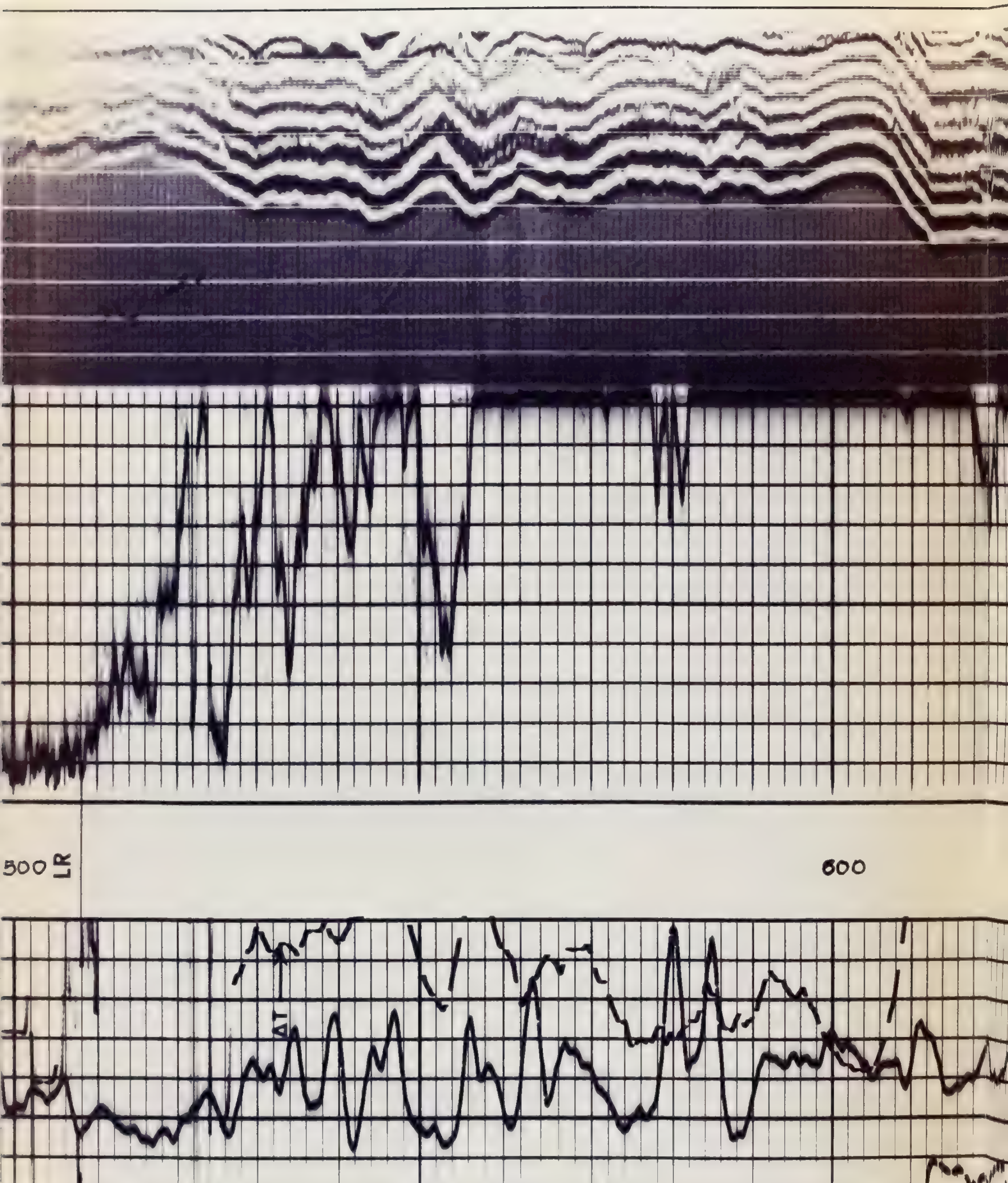
0 150

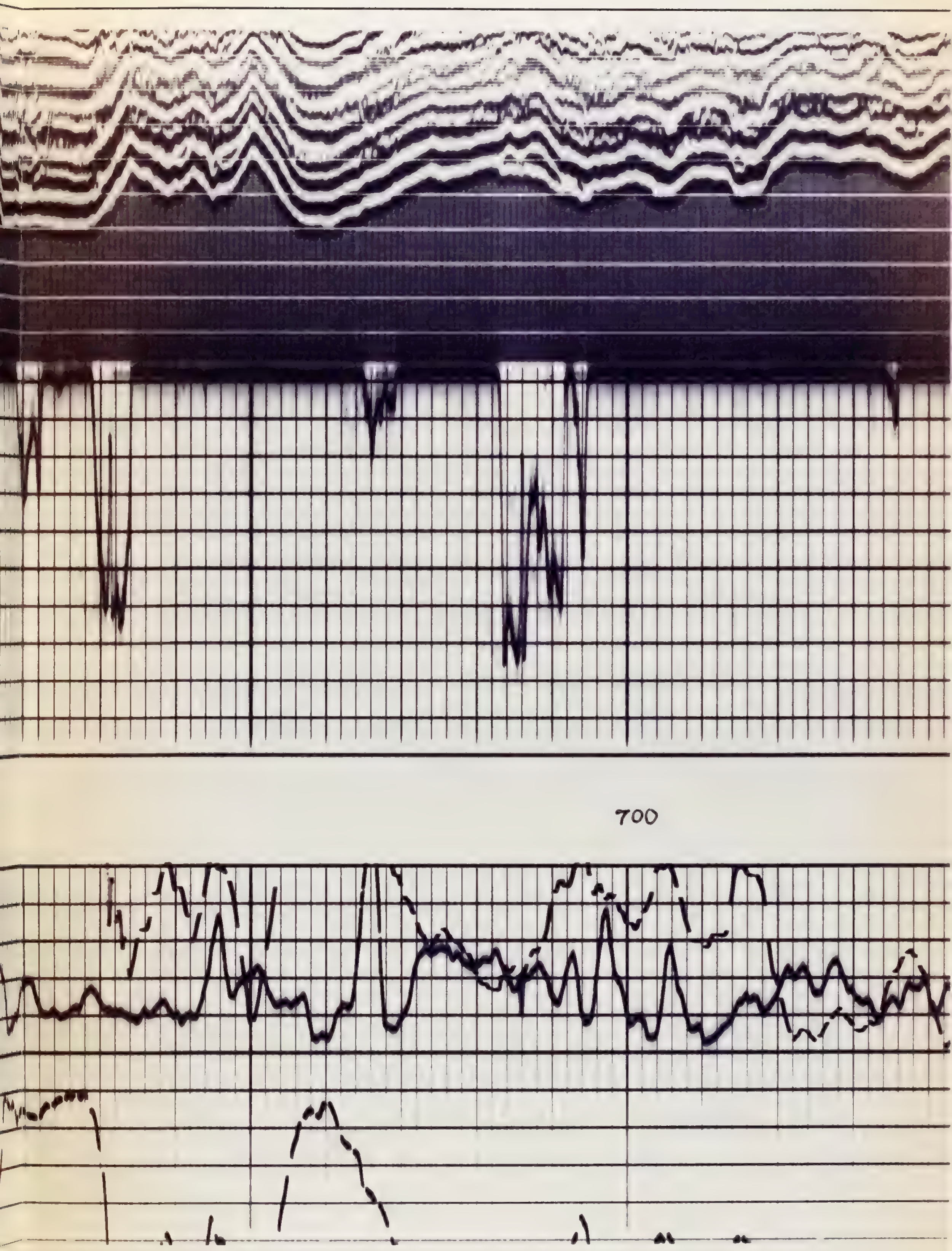
150 300

CALIBRATION AFTER SURVEY




Amplitude Curve
400
GR


500
LR
600
ΔT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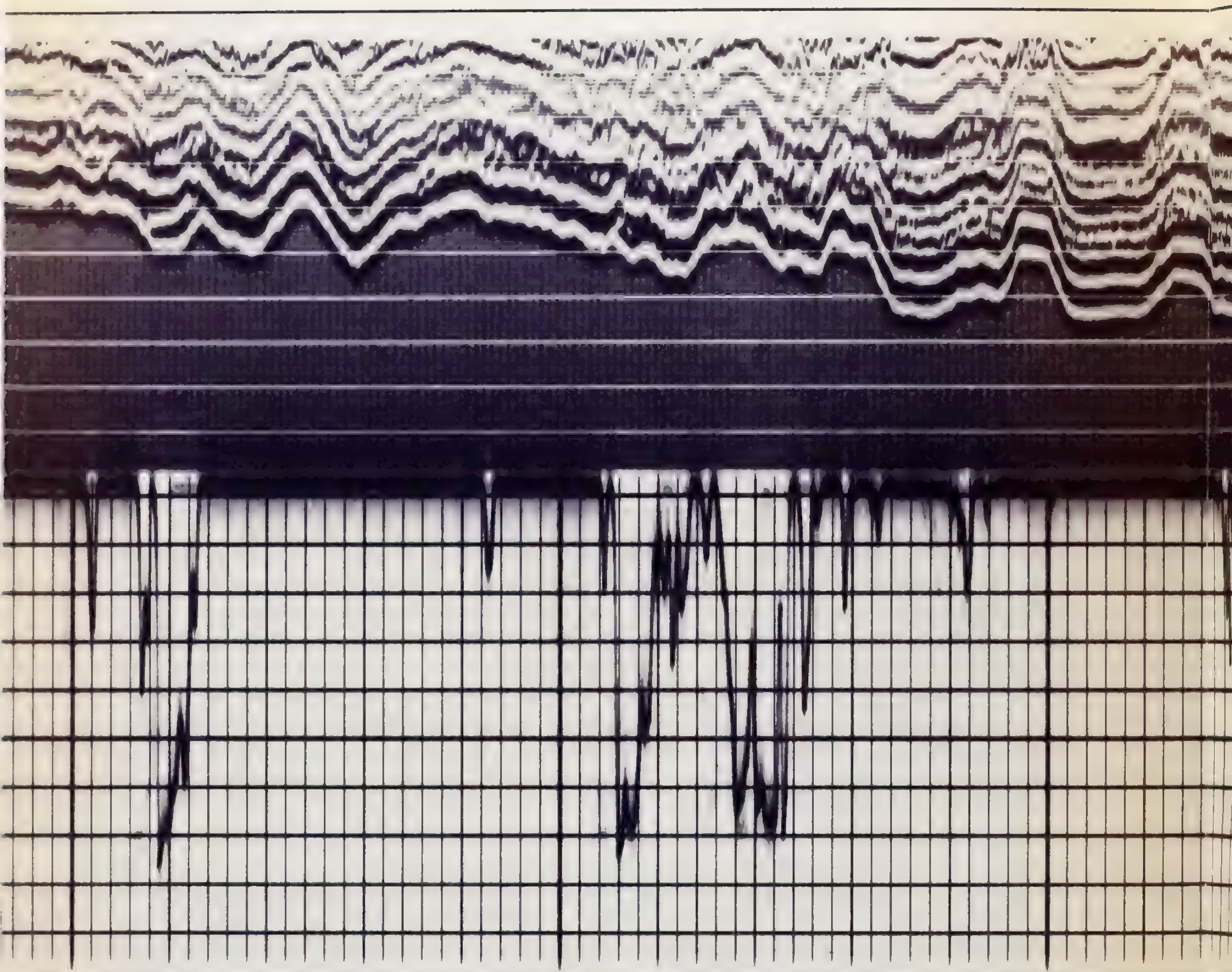
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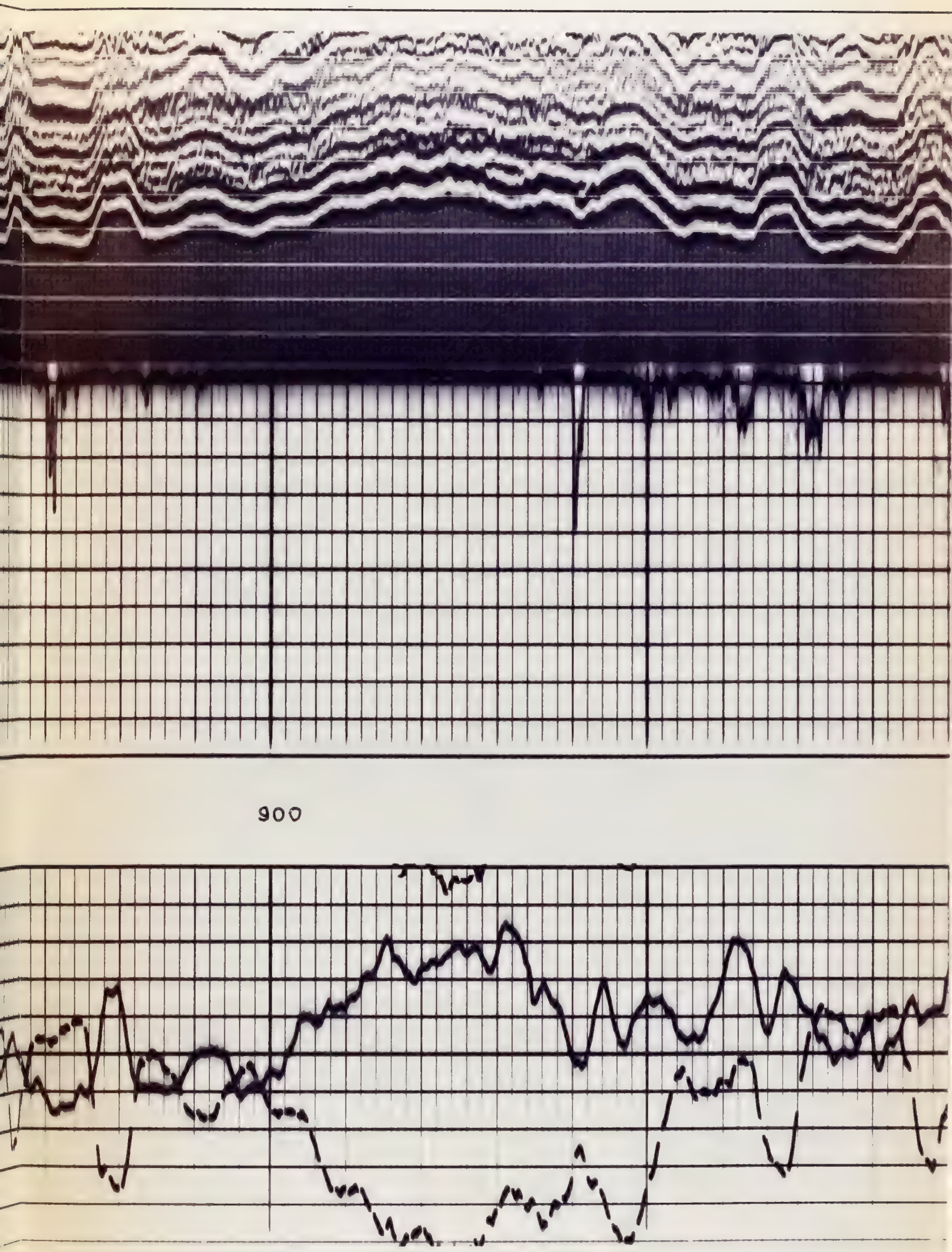
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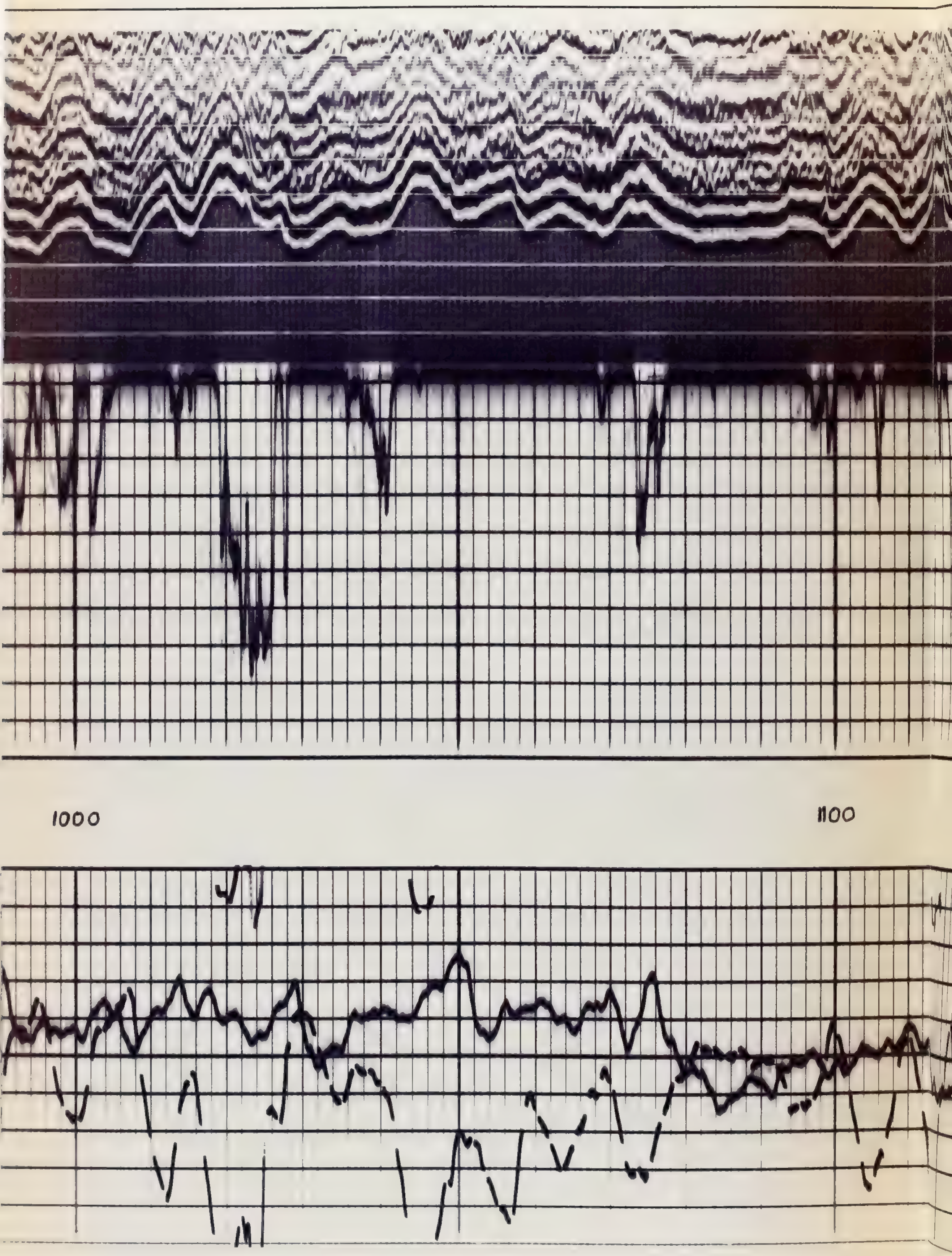
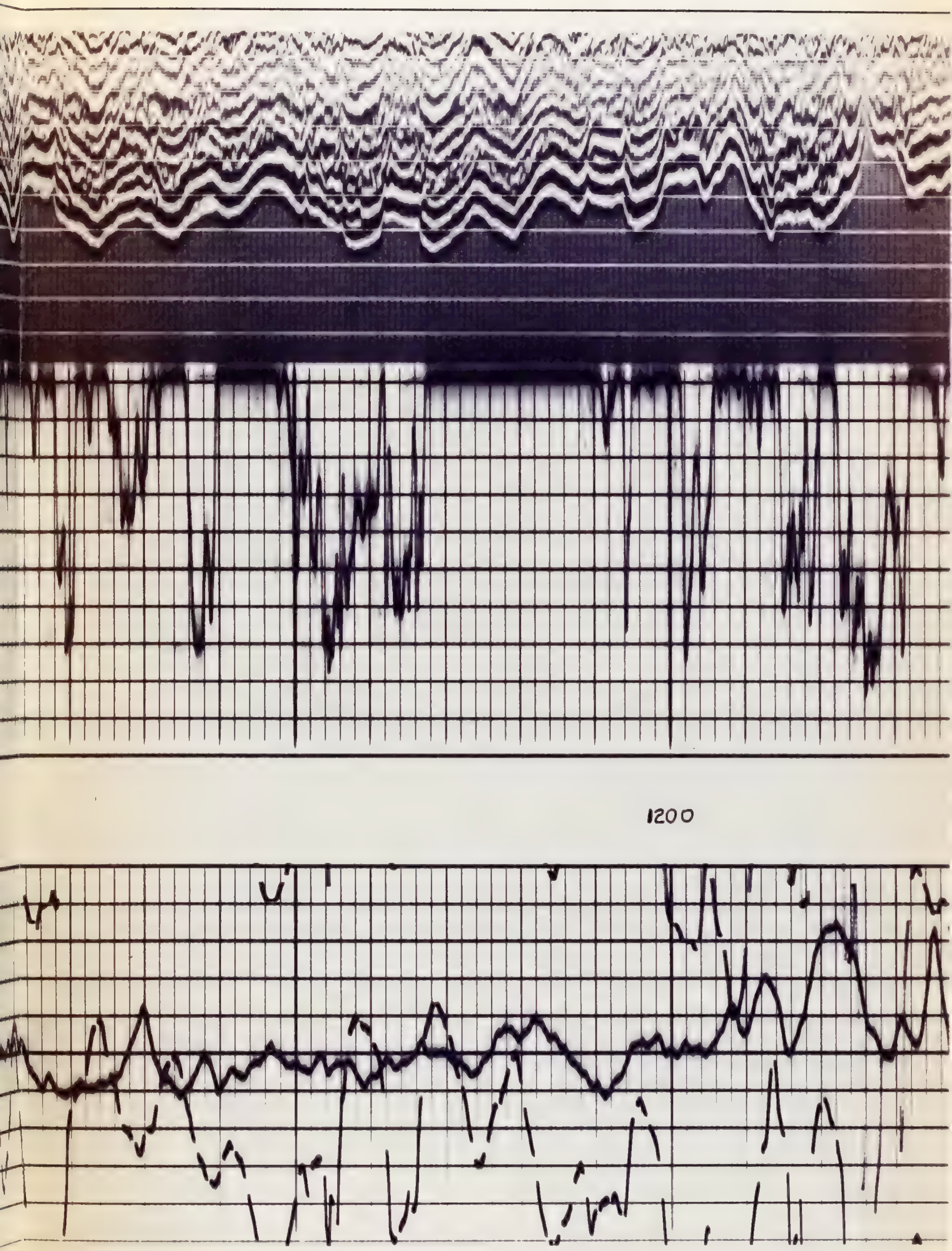

1000
1100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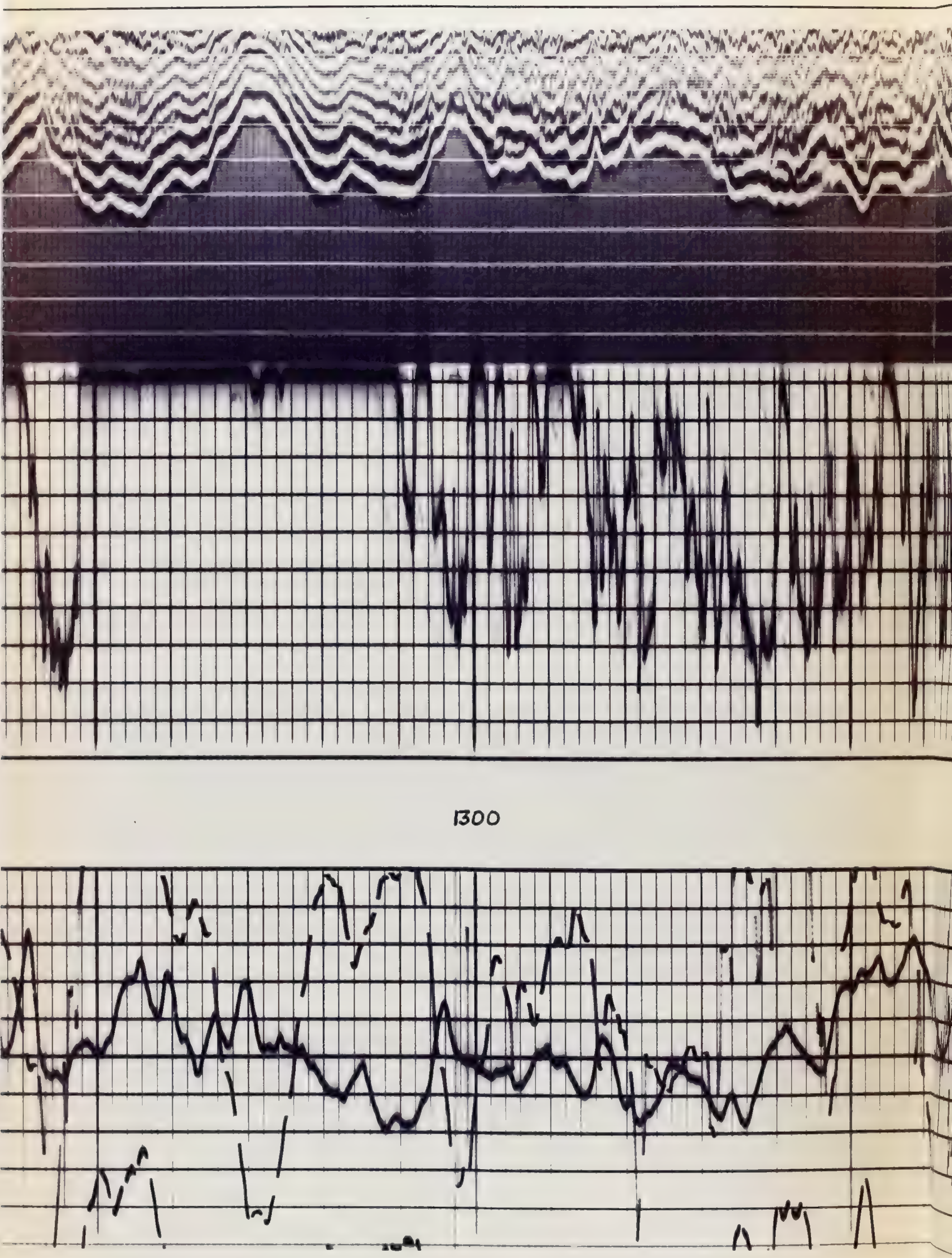
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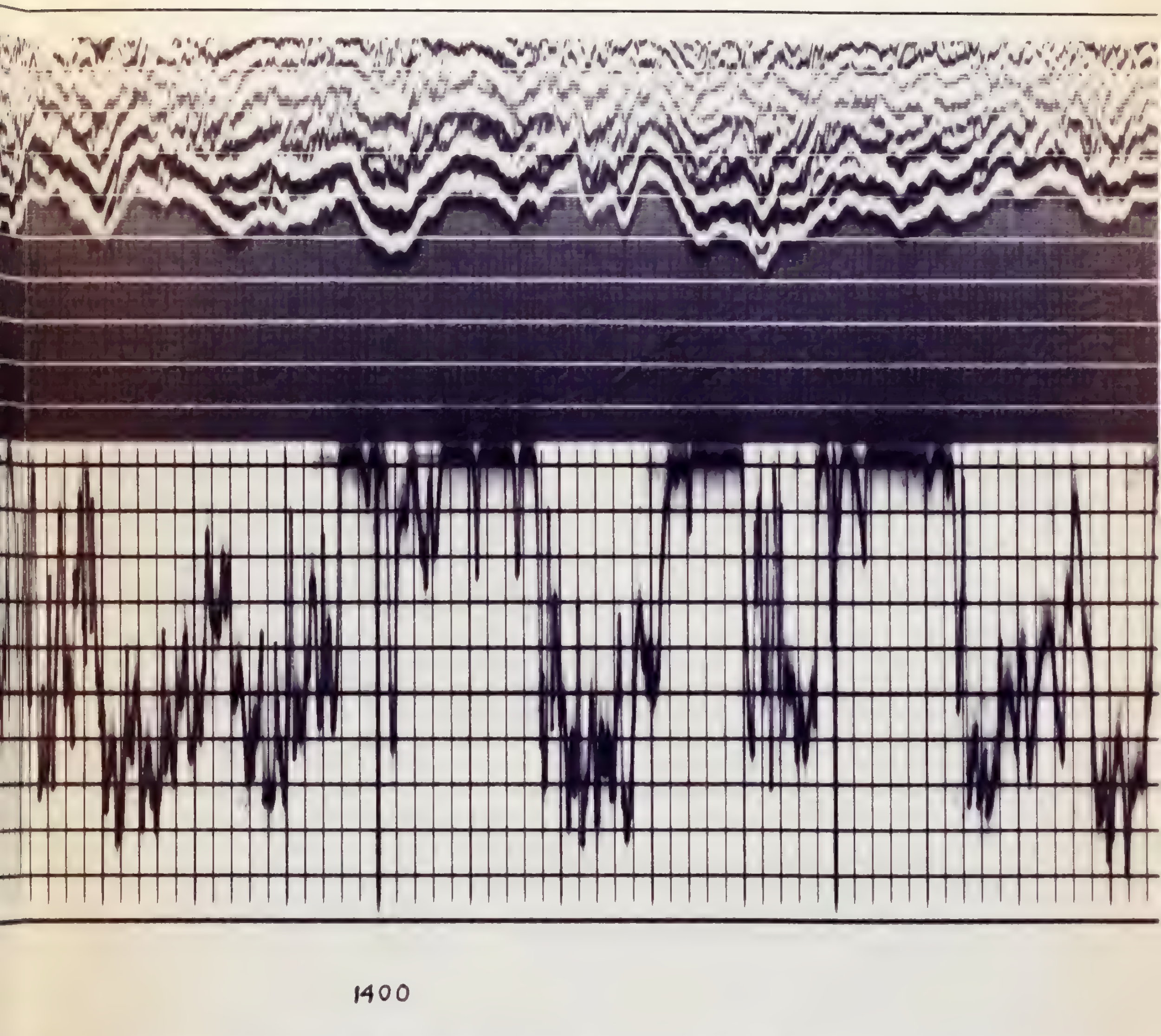
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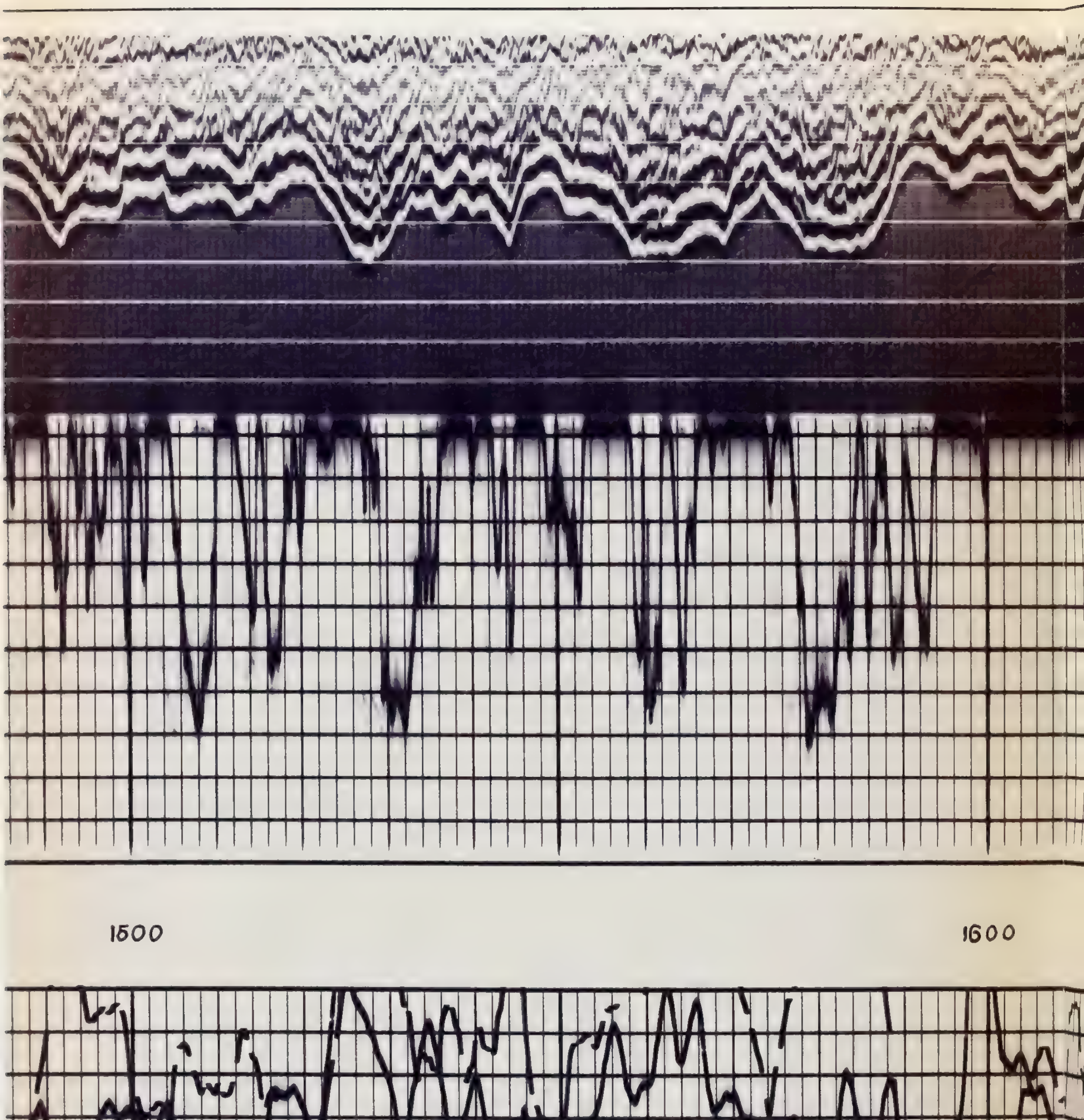
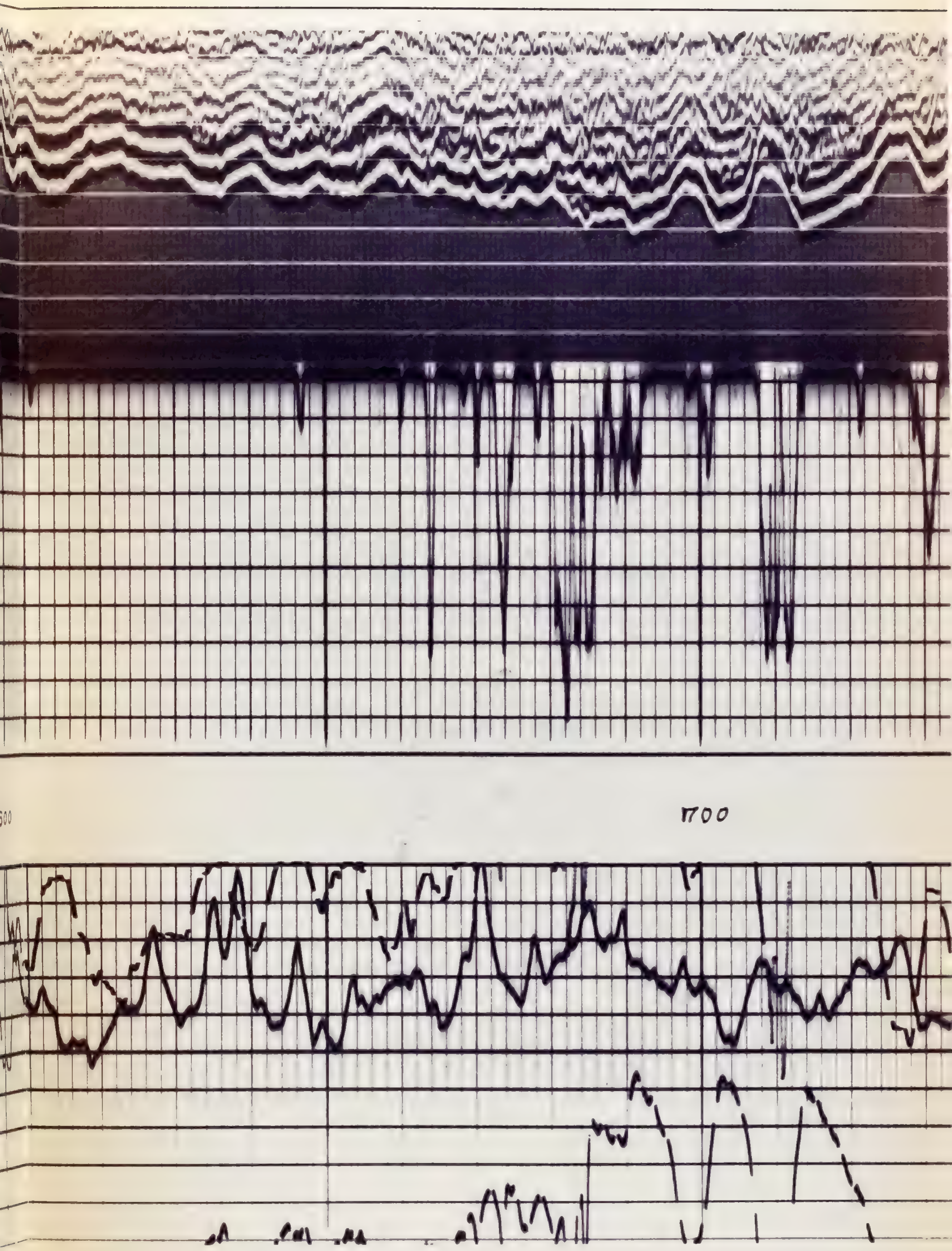

1500
1600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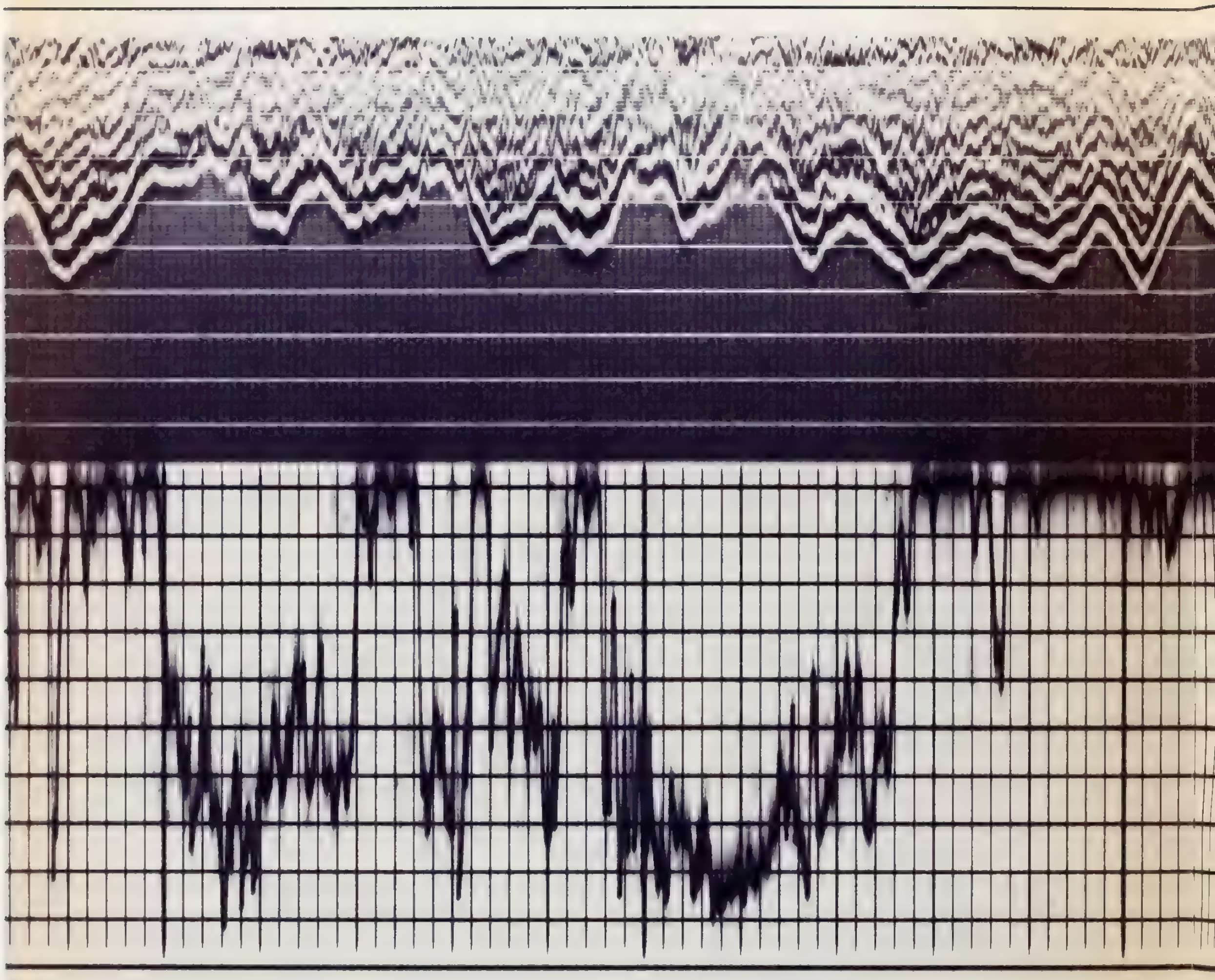
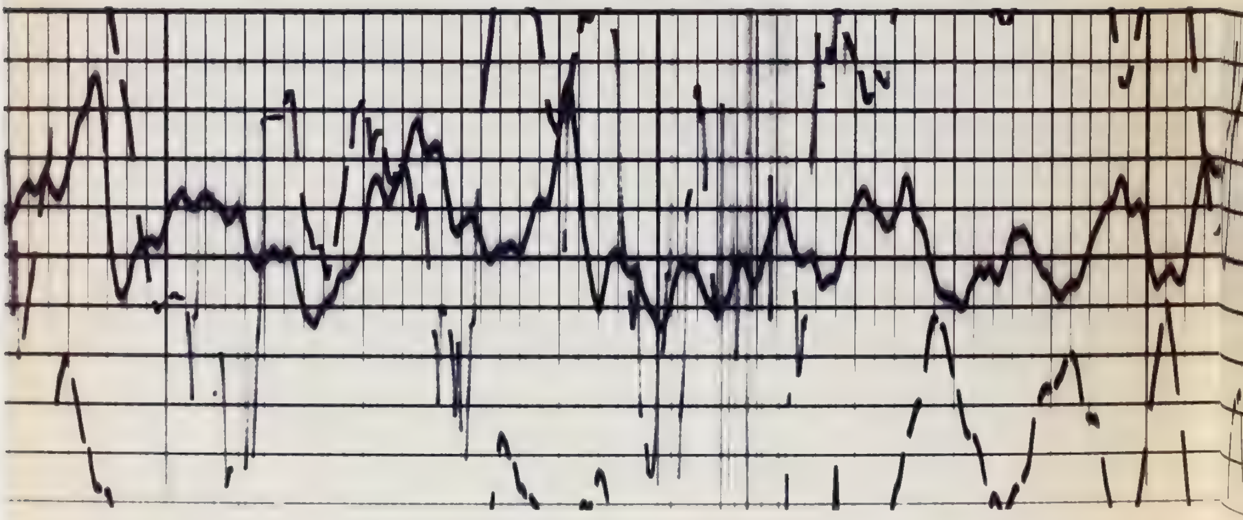
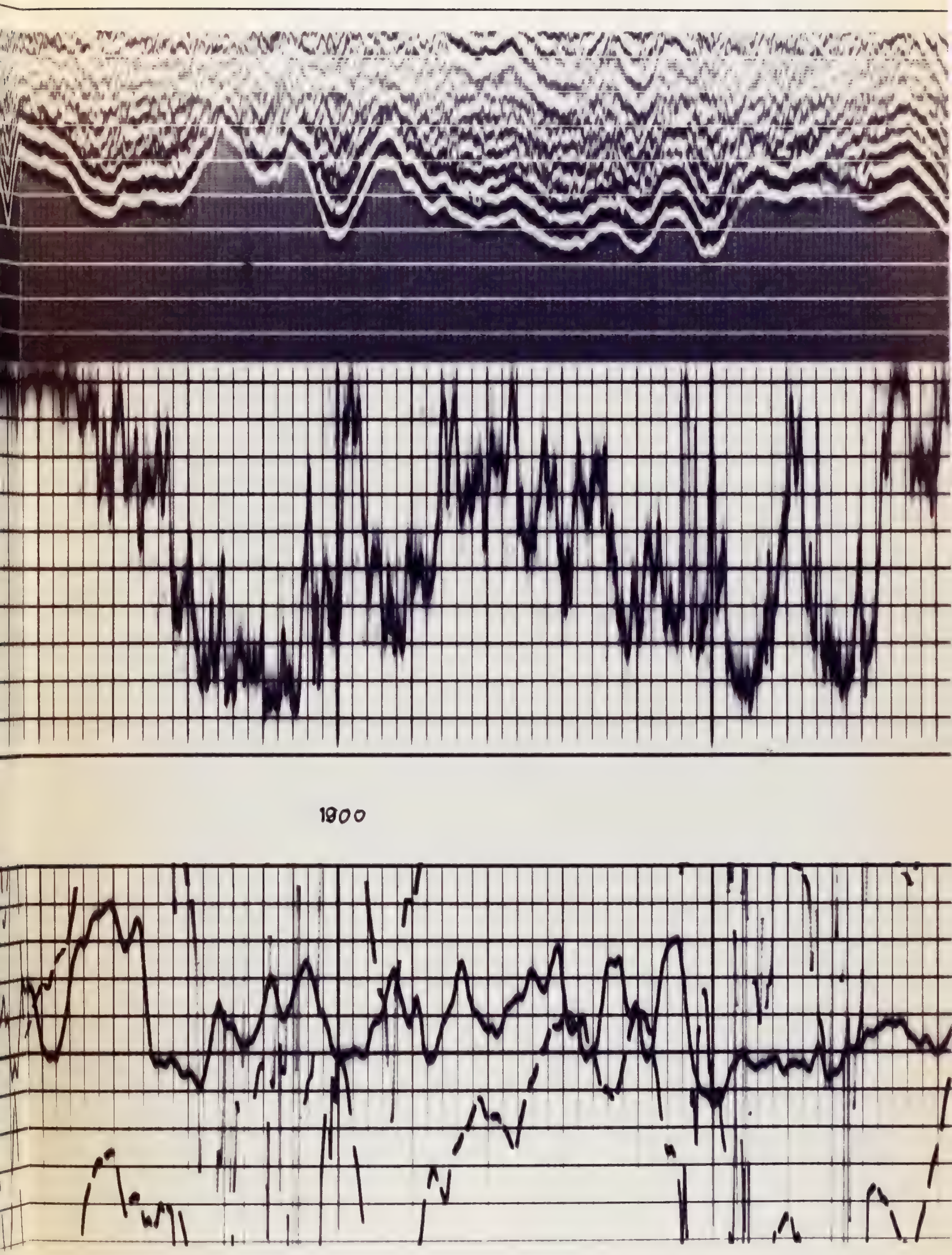




1800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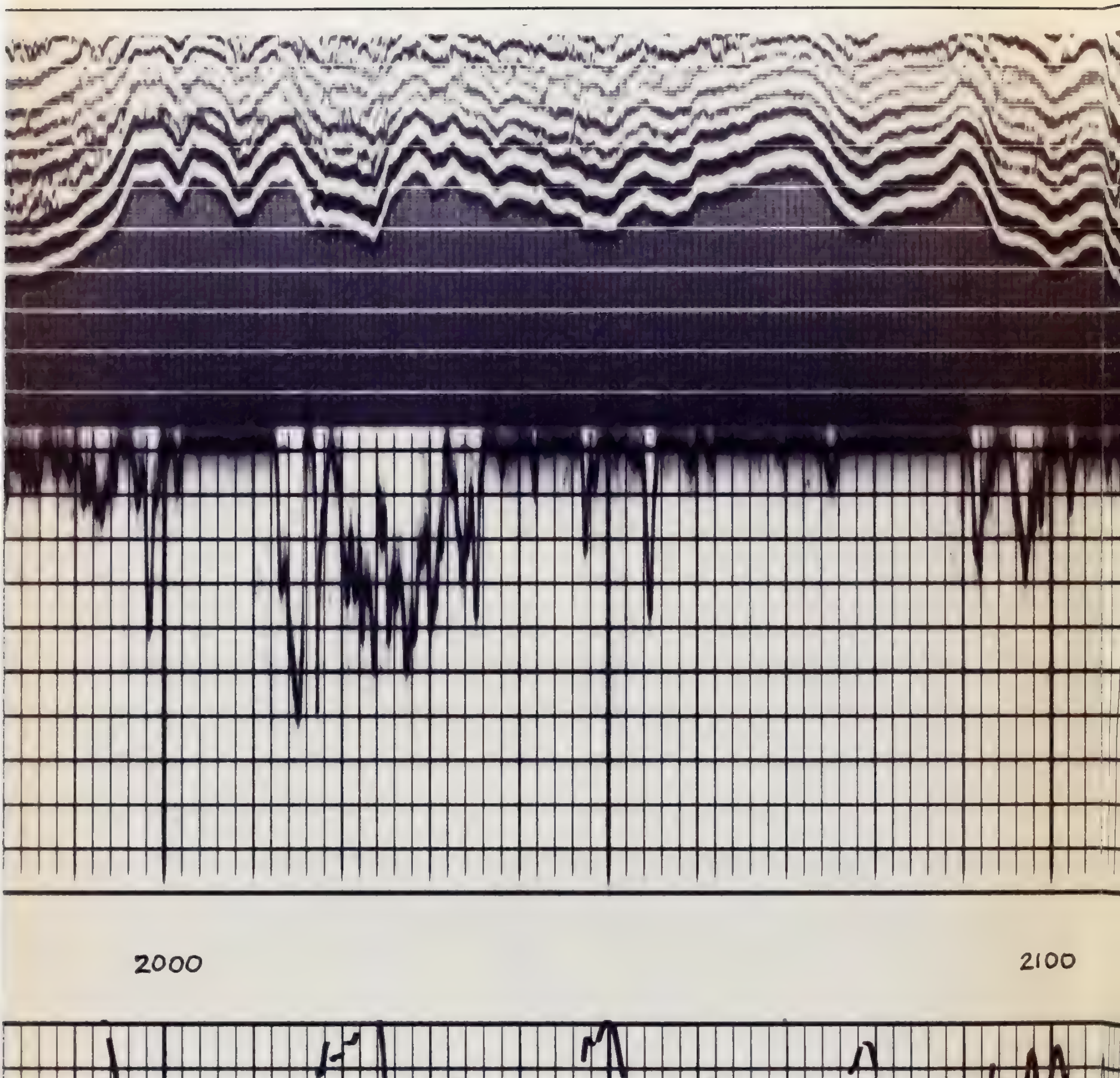
2000
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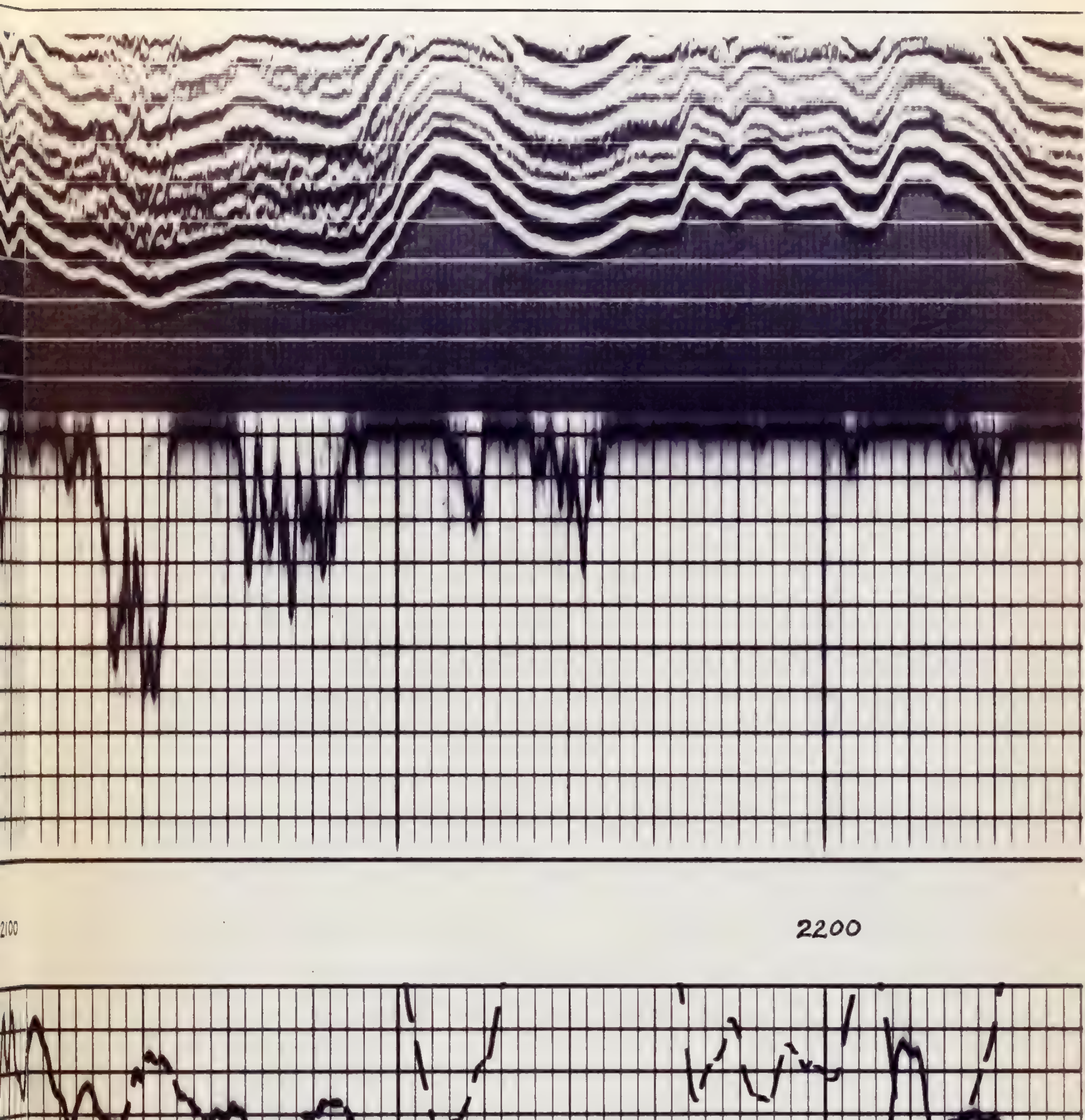
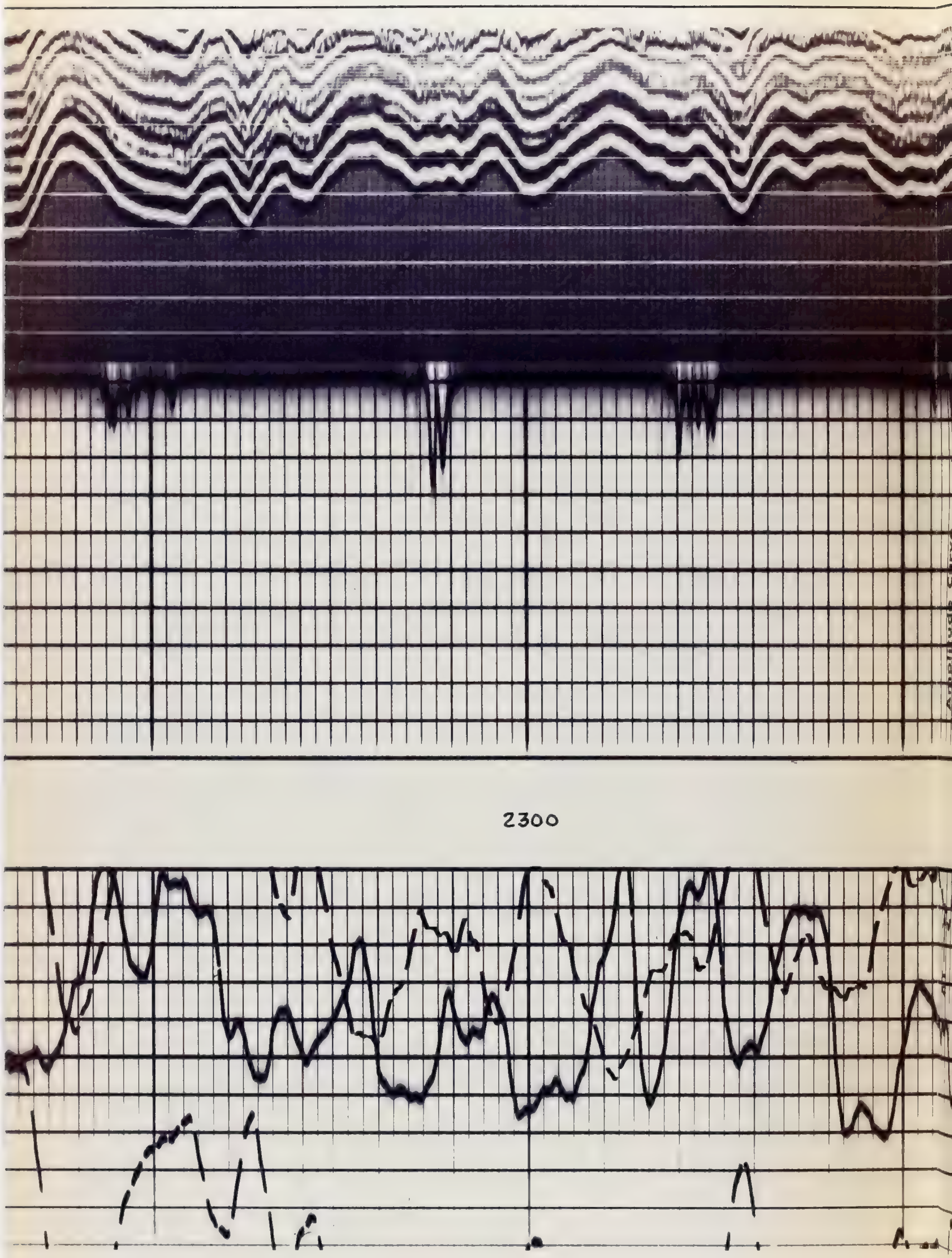
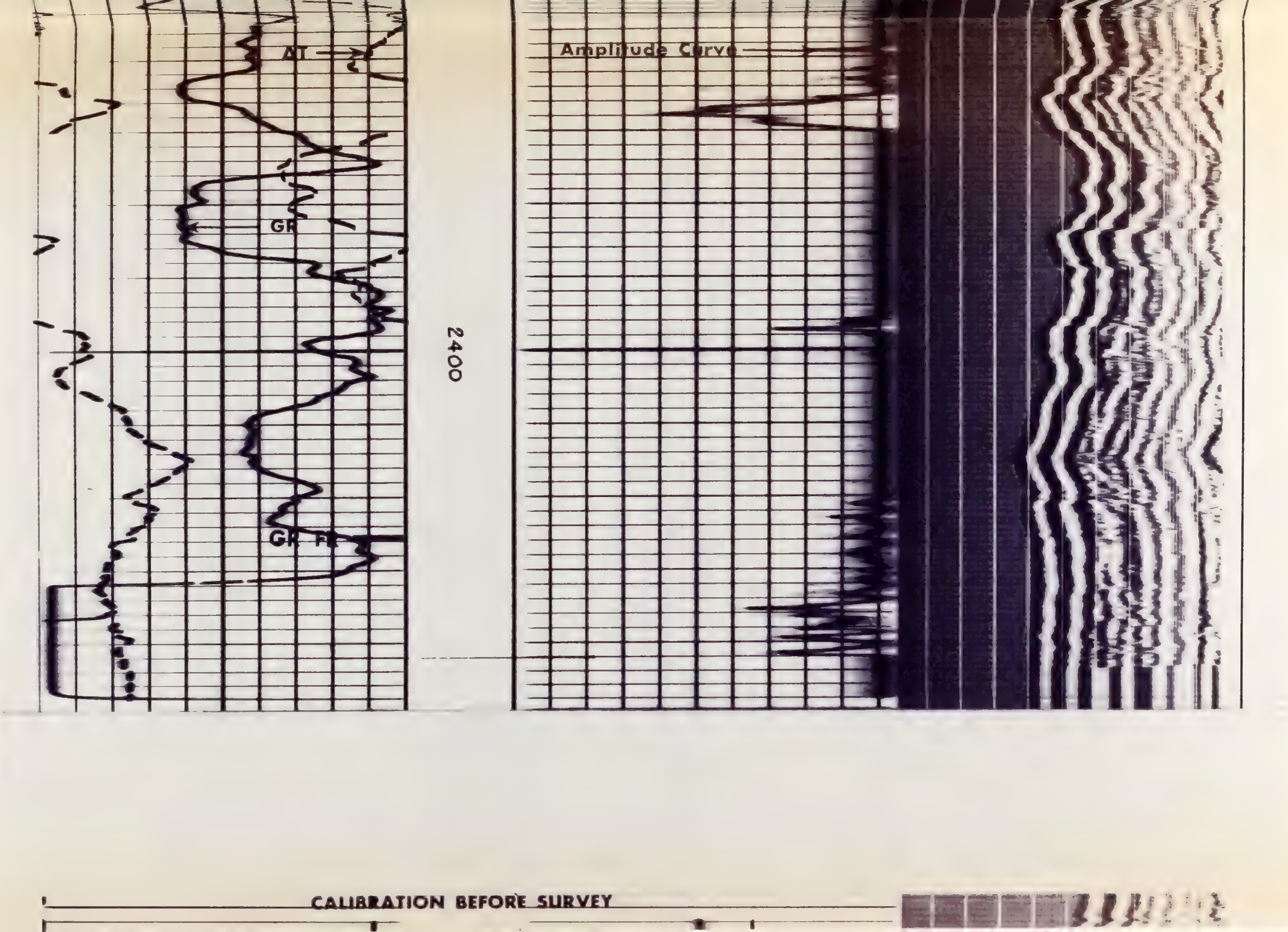
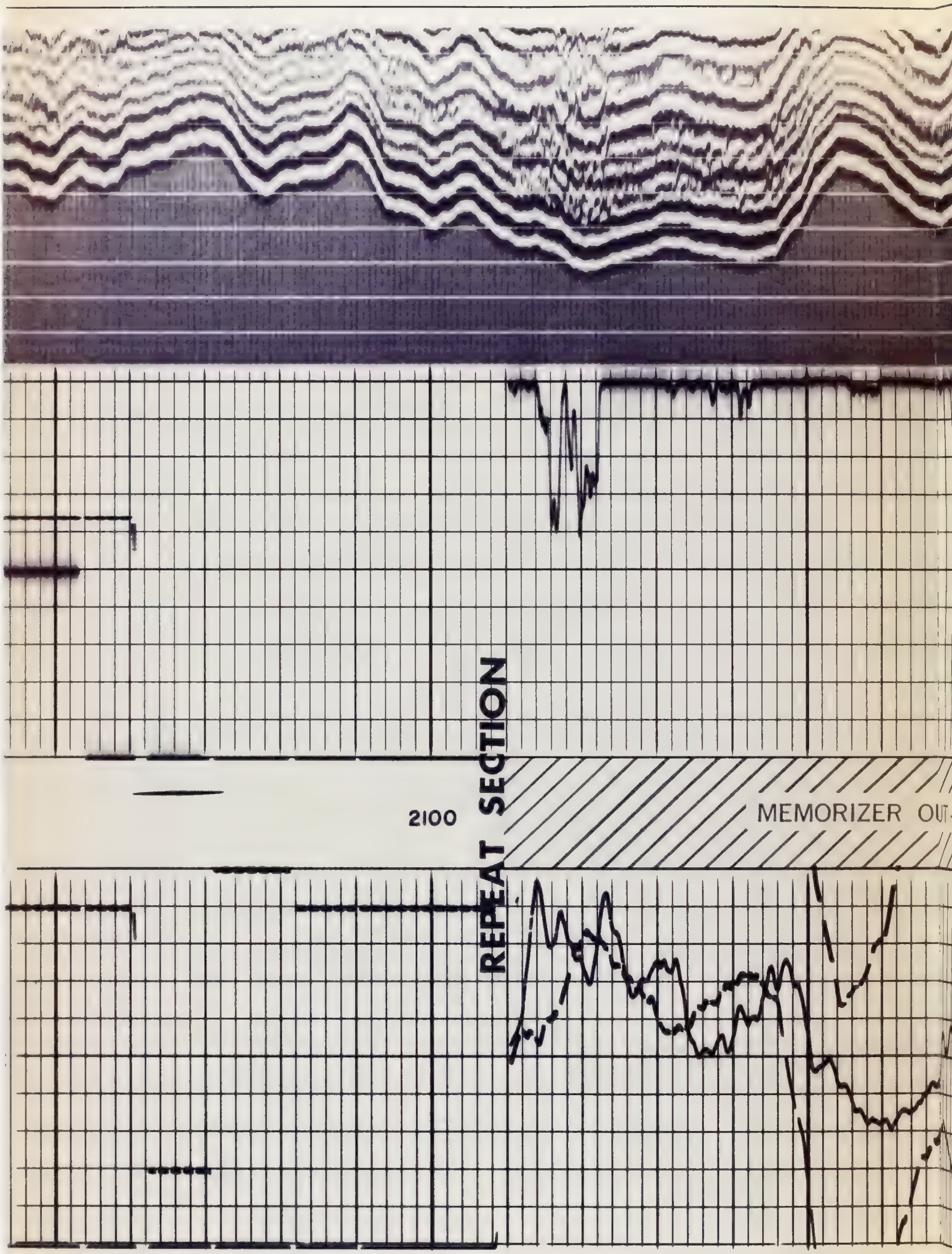
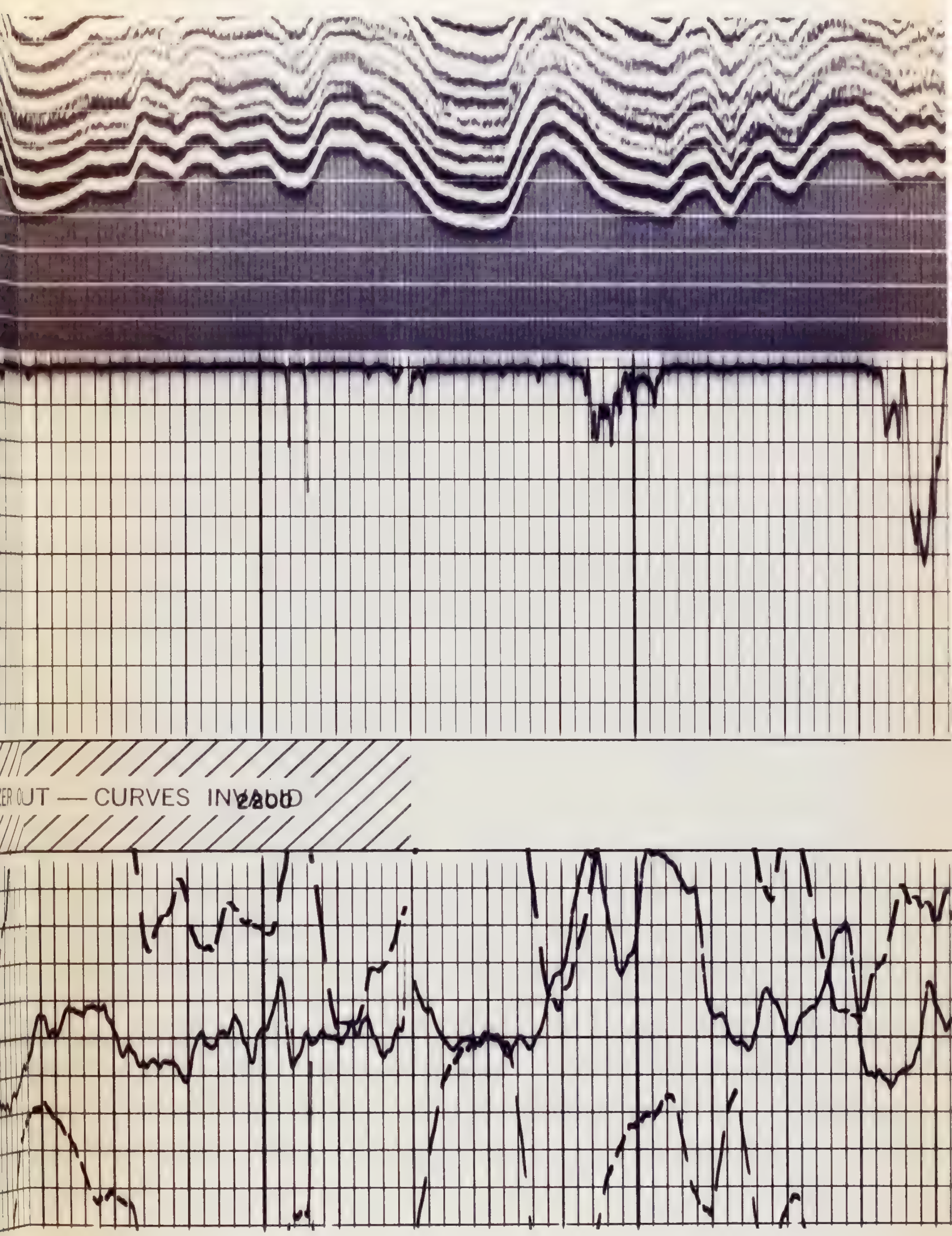


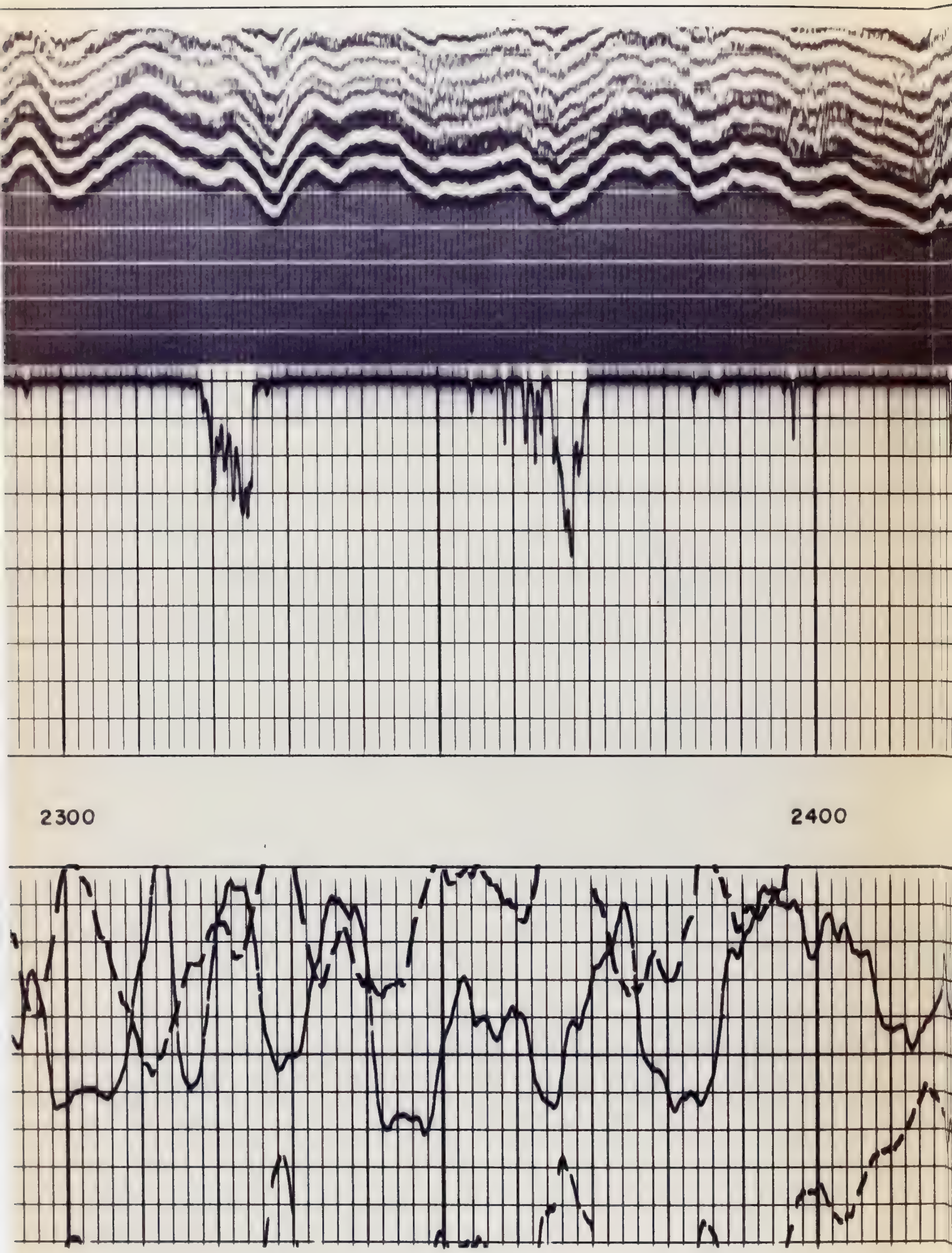
2100
2200

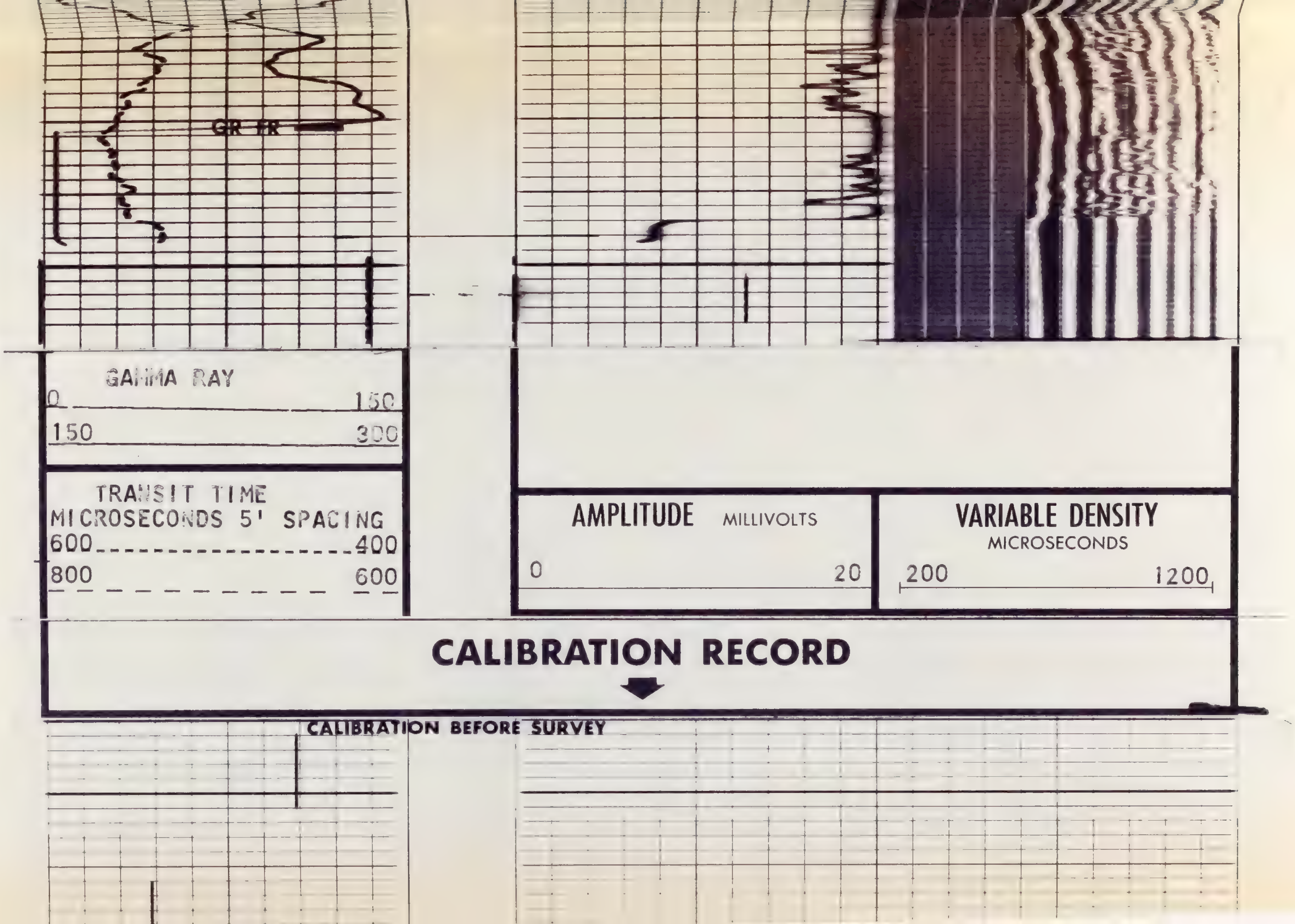

2300
Amplitude Curv

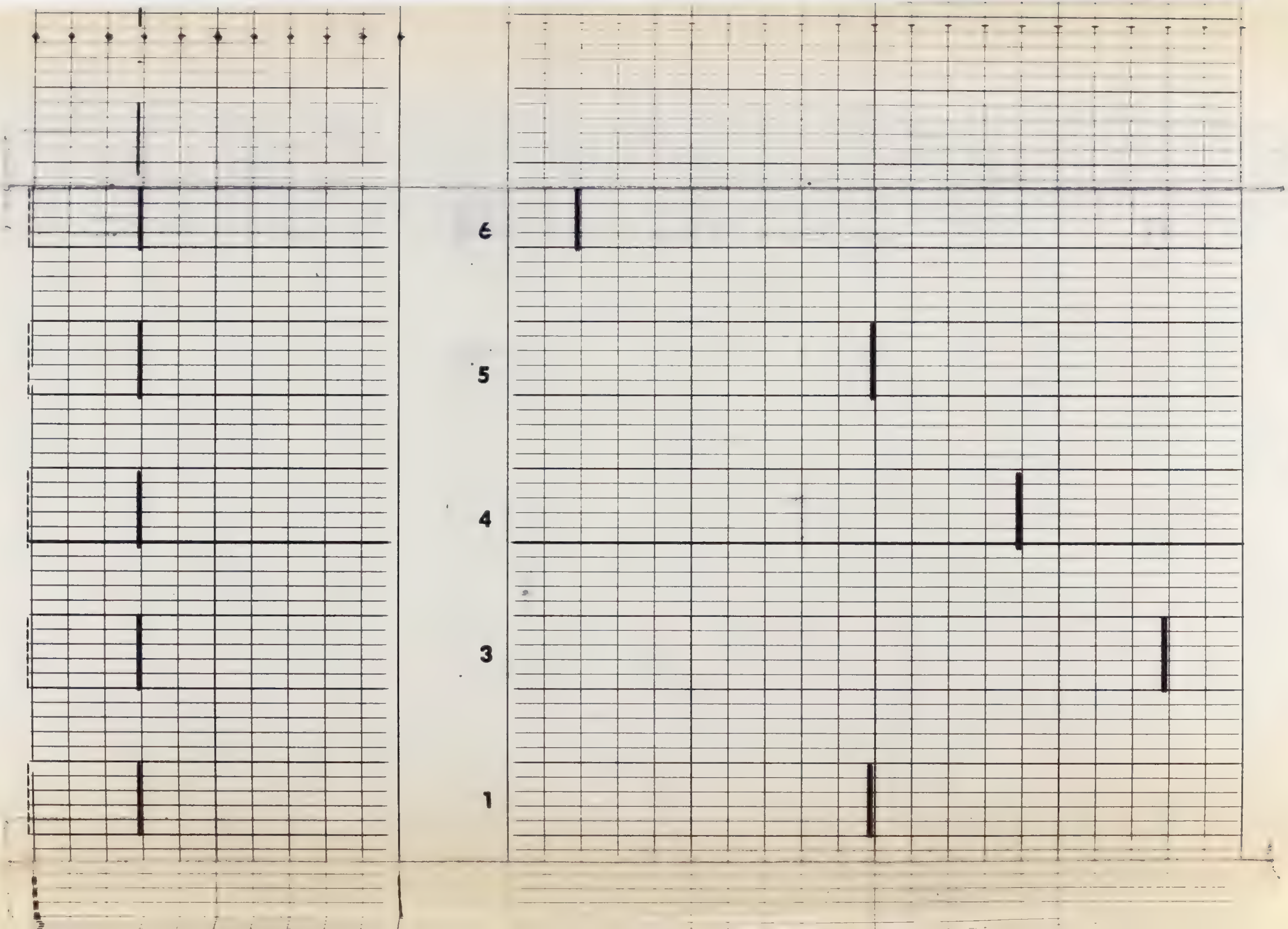

AT
Amplitude Curve
GR
2400
GR
CALIBRATION BEFORE SURVEY

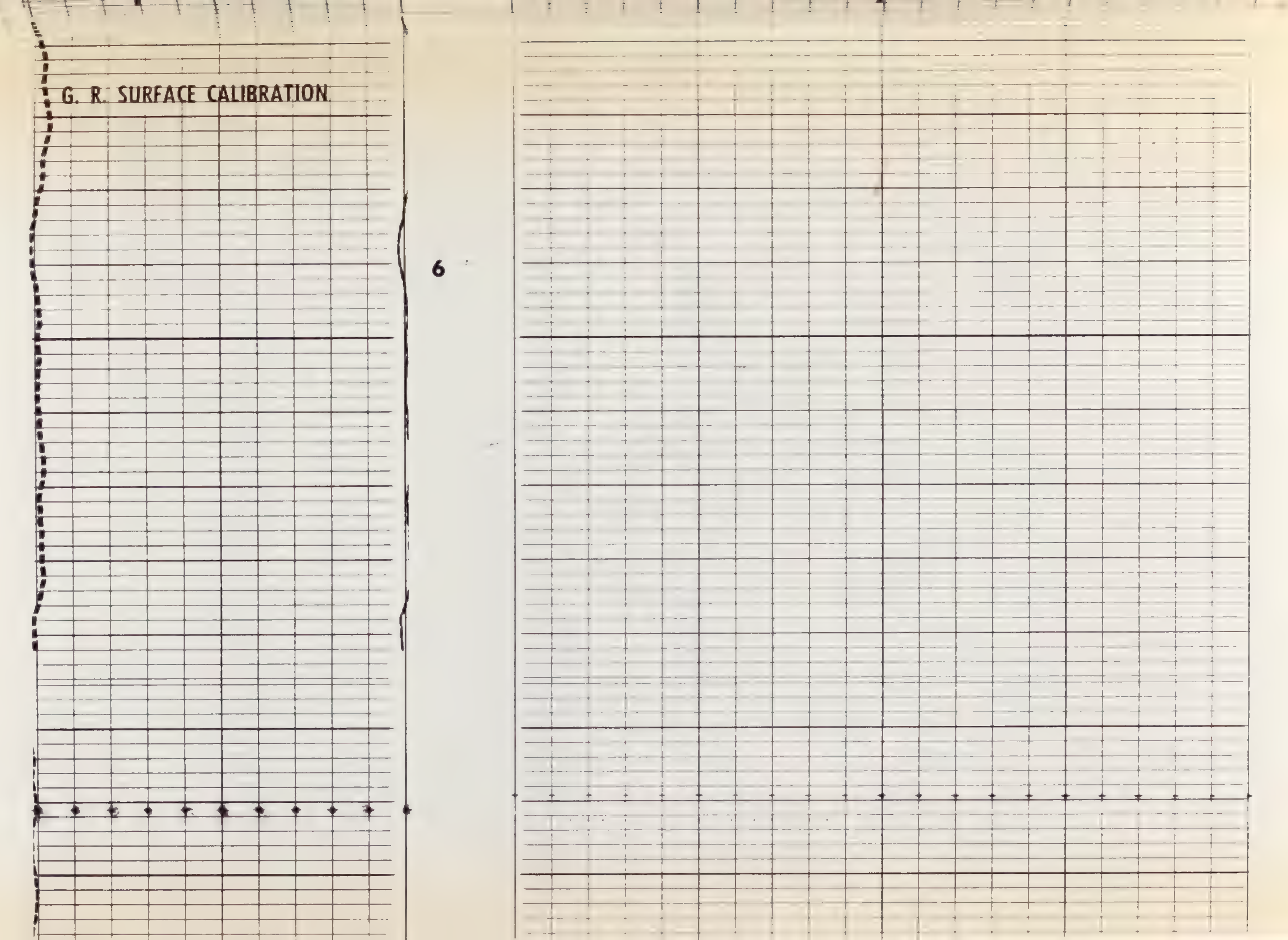

2100
REPEAT SECTION
MEMORIZER OUT

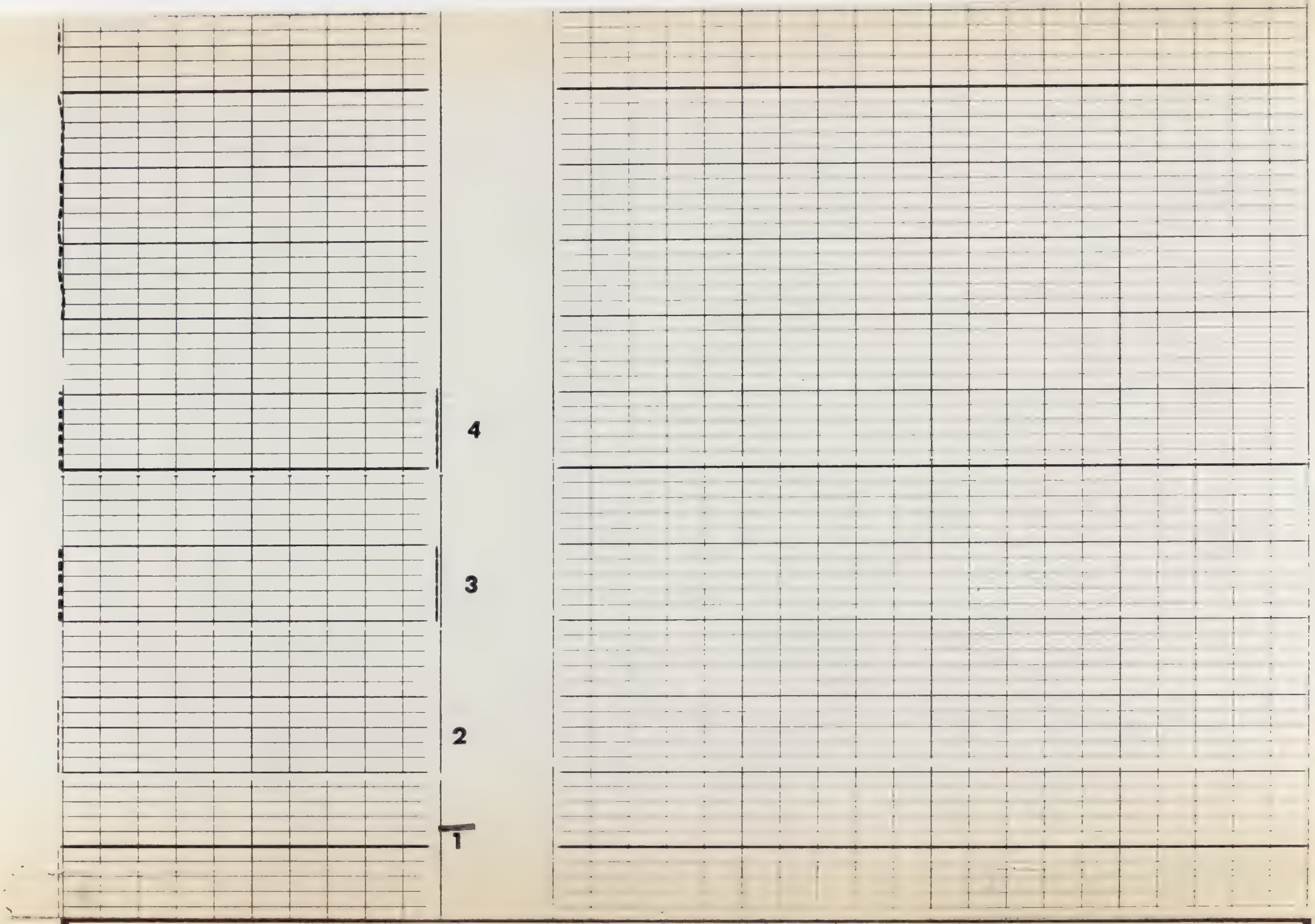

ER OUT — CURVES INVALID
2200


2300
2400


GR FR
GAMMA RAY
0
150
150
300
TRANSIT TIME
MICROSECONDS 5' SPACING
600
400
800
600
AMPLITUDE MILLIVOLTS
0
20
VARIABLE DENSITY
MICROSECONDS
200
1200
CALIBRATION RECORD
CALIBRATION BEFORE SURVEY


6
5
4
3
1


G. R. SURFACE CALIBRATION
6



BOREHOLE COMPENSATED SONIC CALIBRATION CODING

BOREHOLE COMPENSATED SONIC CALIBRATION CODING

1. MECHANICAL ZERO
2. 40 μ SEC/FT
3. 60 μ SEC/FT
4. 80 μ SEC/FT
5. 100 μ SEC/FT
6. 140 μ SEC/FT

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY
4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATION

CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY
WELL SORGHUM GULCH NO. 17
FIELD SORGHUM GULCH
COUNTY RIO BLANCO STATE COLORADO

SCHL. FR 2446
SCHL. TD 2454
DRLR TD 2460

Elev: KB 7044
DF 7043
GL 7036

COUNTY RIO BLANCO
FIELD

Perm
Log
Drillin

Date
Run N
Depth-
Depth-
Btm. Lo
Top Lo
Casing
Casing
Casing
Casing
Casing
Bit Siz
Type
Den
Time
BHT
Equi
Recor
Witne

Schlumberger

TEMPERATURE LOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL SORGHUM GULCH #17
COMPANY ARCO

COMPANY ATLANTIC RICHFIELD

WELL SORGHUM GULCH NO. 17

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE CLORADO

LOCATION
436'FWL & 181' FLS
Sec. 16 Twp. 35 Rge. 96W

Other Services:
GR-BHC
VDL-AMP
FDC
DLL-HRT

Permanent Datum: GL ; Elev.: 7036
Log Measured From GL , Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 7044
D.F. 7043
G.L. 7036

Date	1/12/75		
Run No.	ONE		
Depth—Driller	2460		
Depth—Logger	2455		
Btm. Log Interval	2454		
Top Log Interval	68		
Casing—Driller	8 5/8 @ 56	@	@
Casing—Logger	60		
Casing Size 1	8 5/8 To 56	To	To
2	To	To	To
Casing Weight 1			
2			
Casing Thickness 1			
2			
Bit Size 1	6 3/4 To 2455	To	To
2	To	To	To
Type Fluid in Hole	AIR MIST		
Dens. Visc.	N/A		
Time Since Circ.	8 HRS		
BHT	115 F		
Equip. Location	5602 GJ		
Recorded By	WALKLEY ETTER		
Witnessed By	BURNS		

REMARKS: SO. NO. 22470

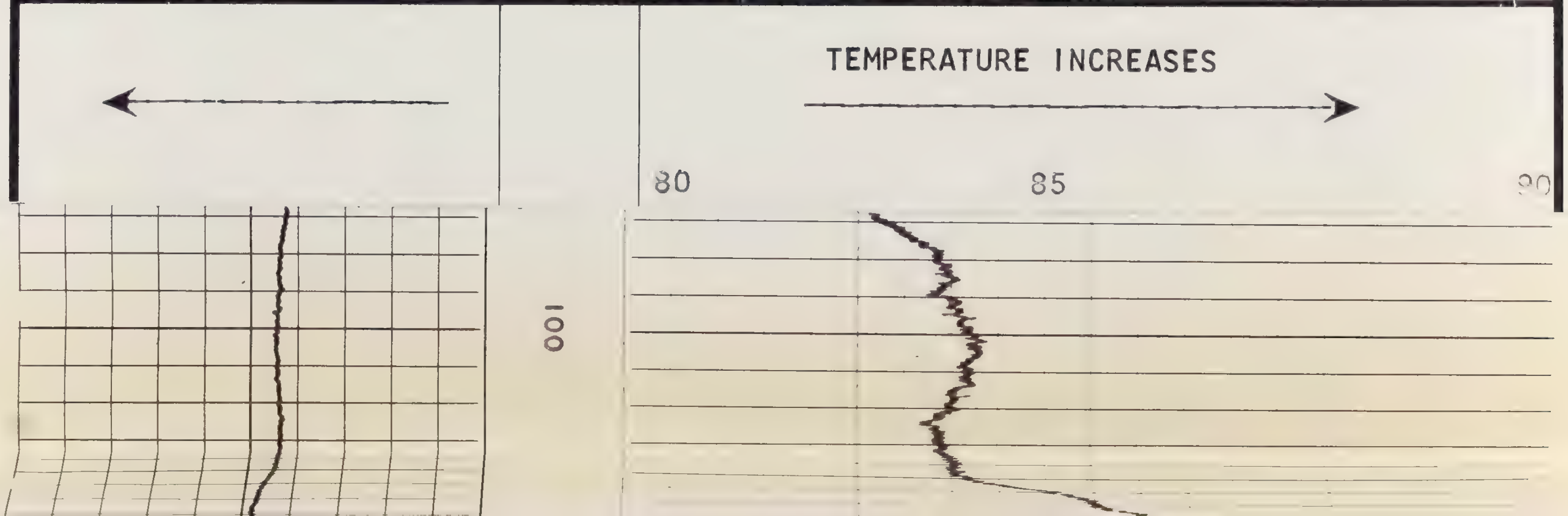
REDUCED SCALE BIAS SHIFT @ 1900' EQUIPMENT DATA:
PANEL PPU-A 777K
SONDE HTS-B 787
HOUSING PAA-A 807

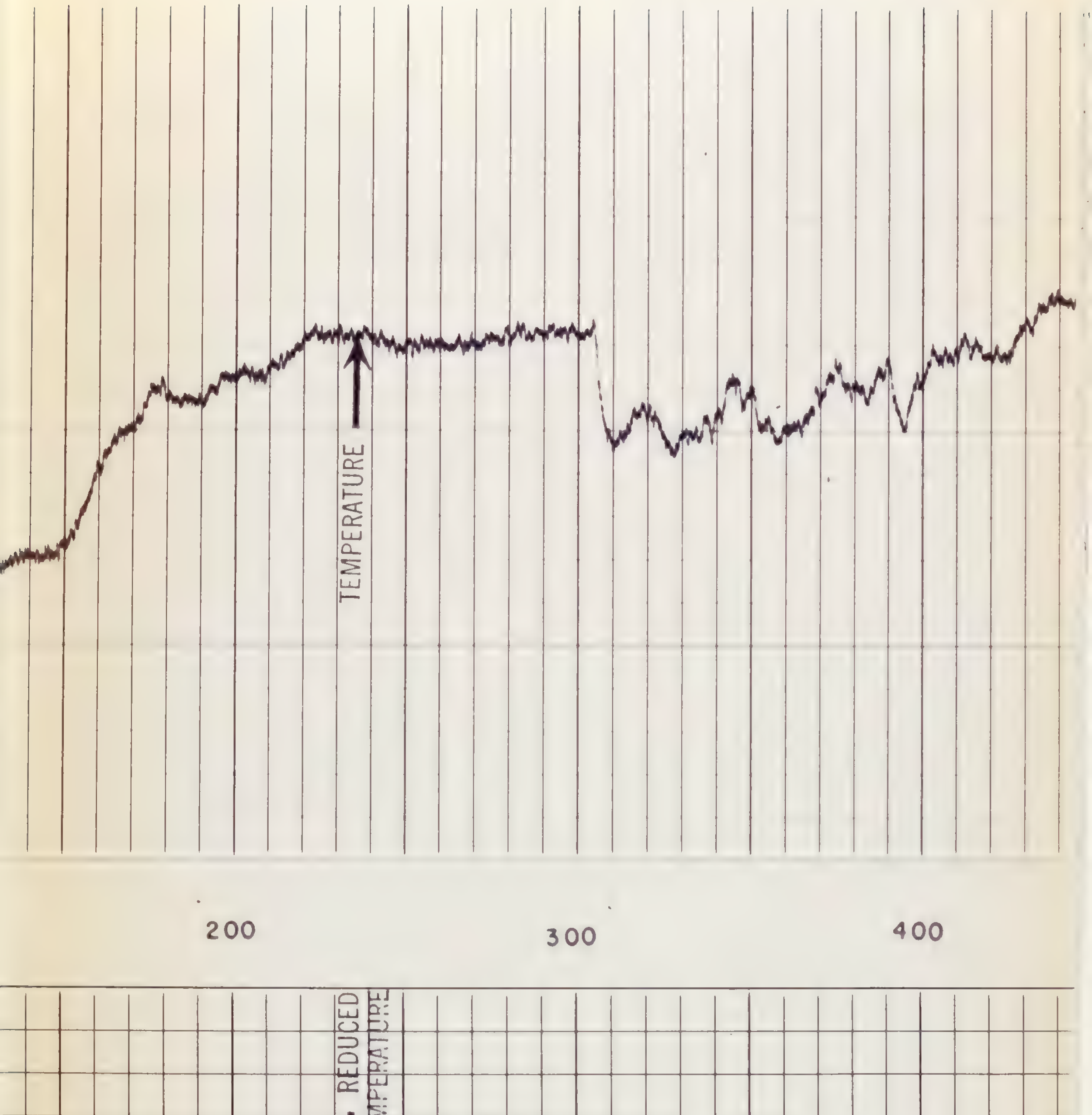
CEMENTATION DATA

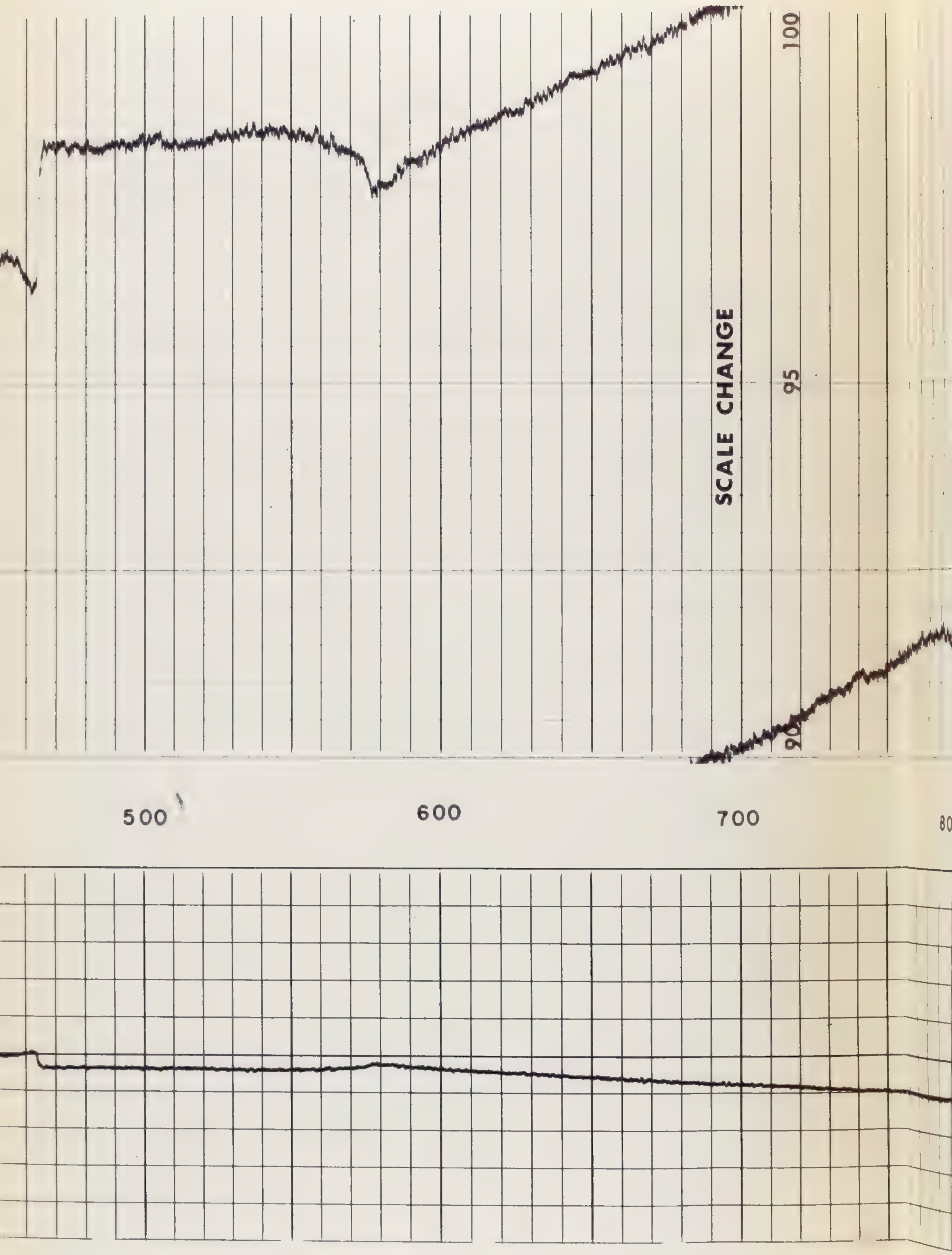
Date	Depth	Type of Cement	Nb of Sacks	Additives	Calculated Top

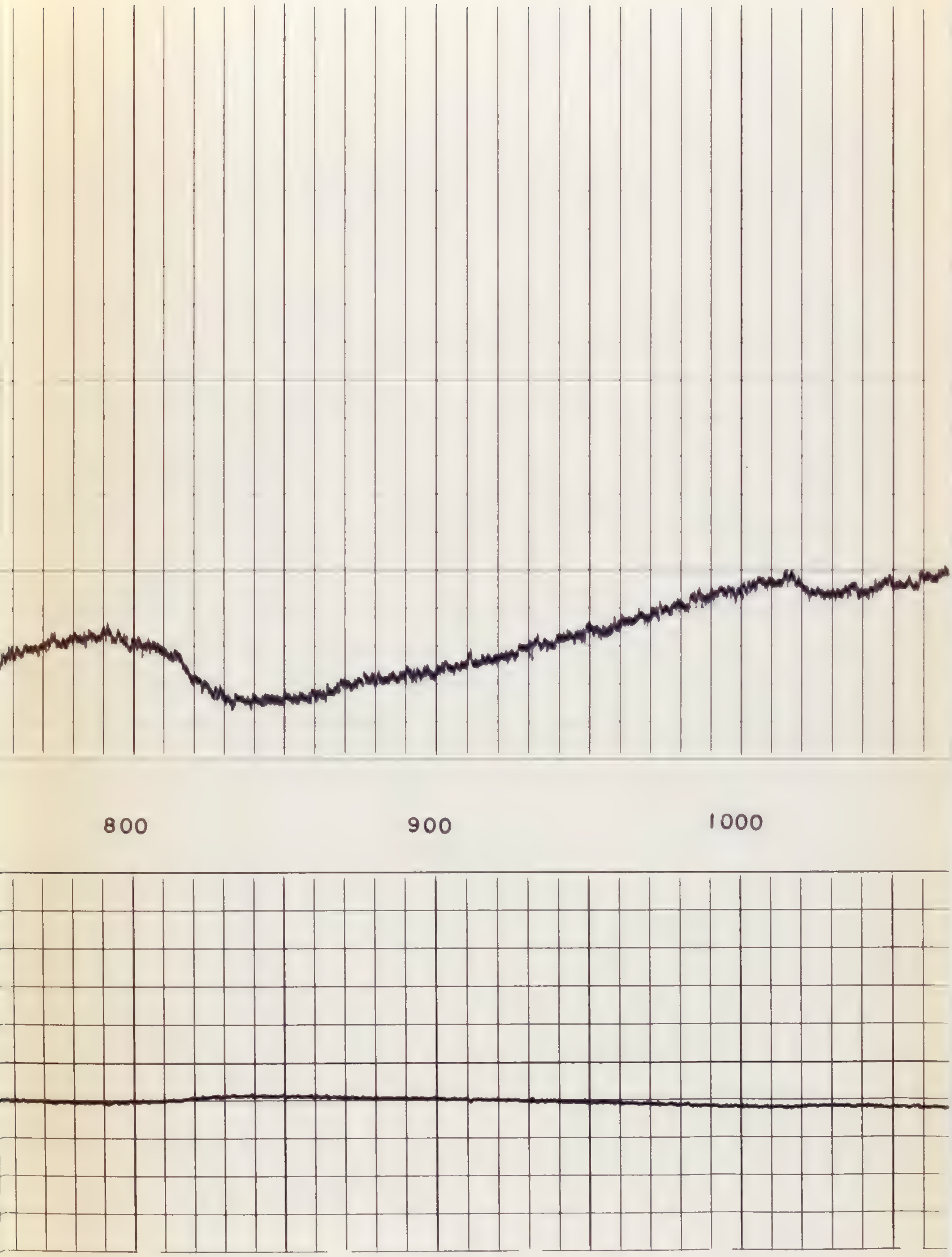
REDUCED SENSITIVITY TEMPERATURE

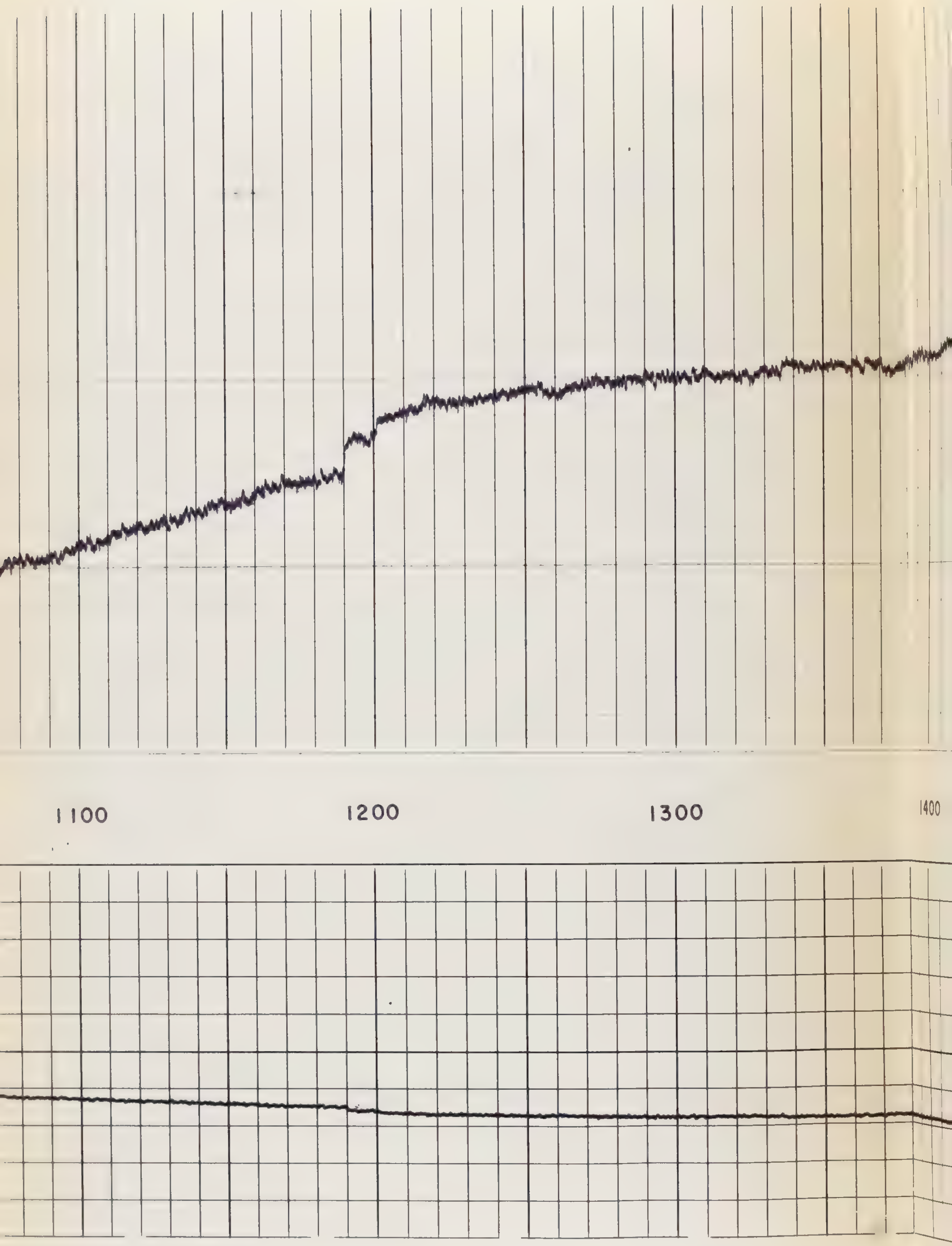
TEMPERATURE °F.

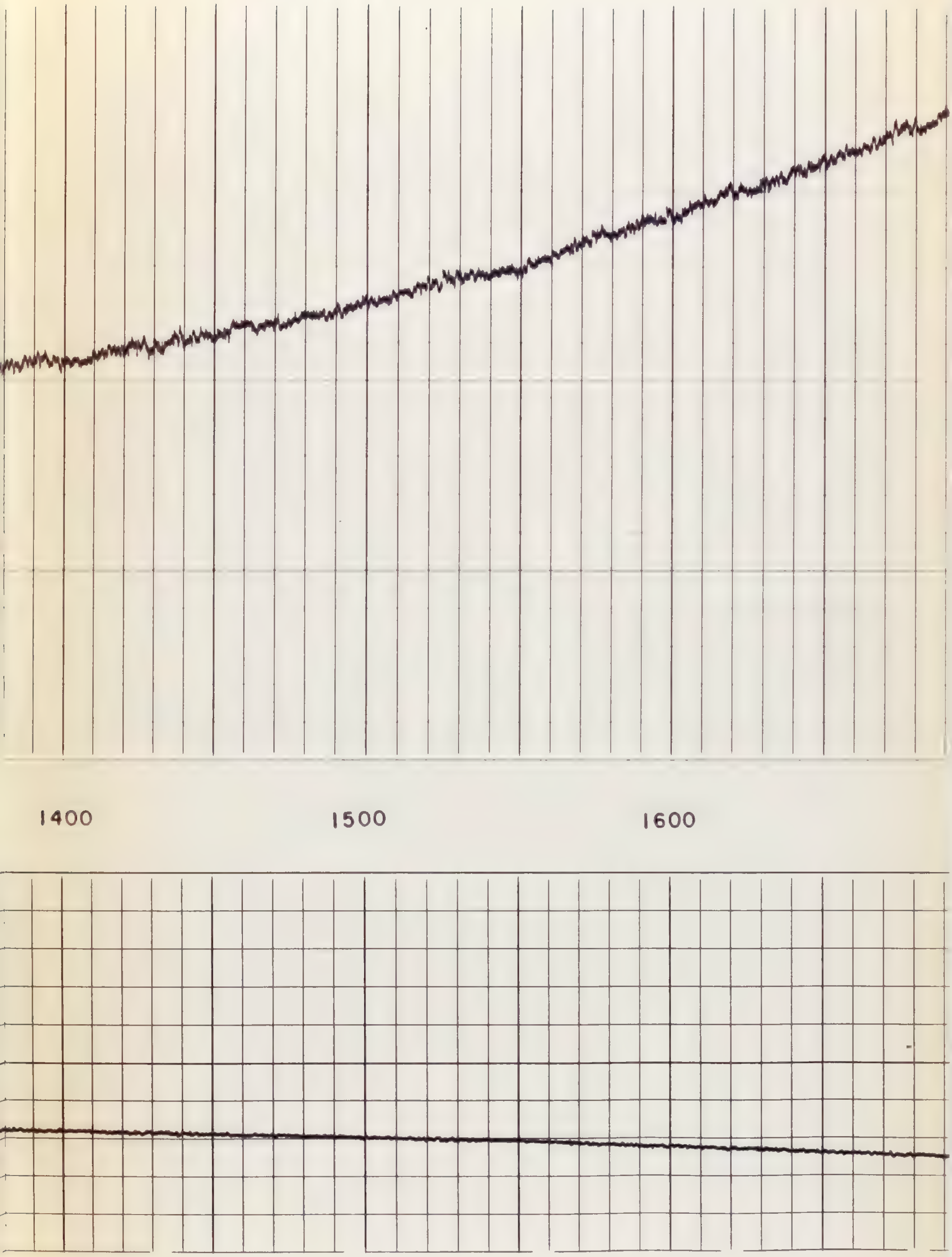


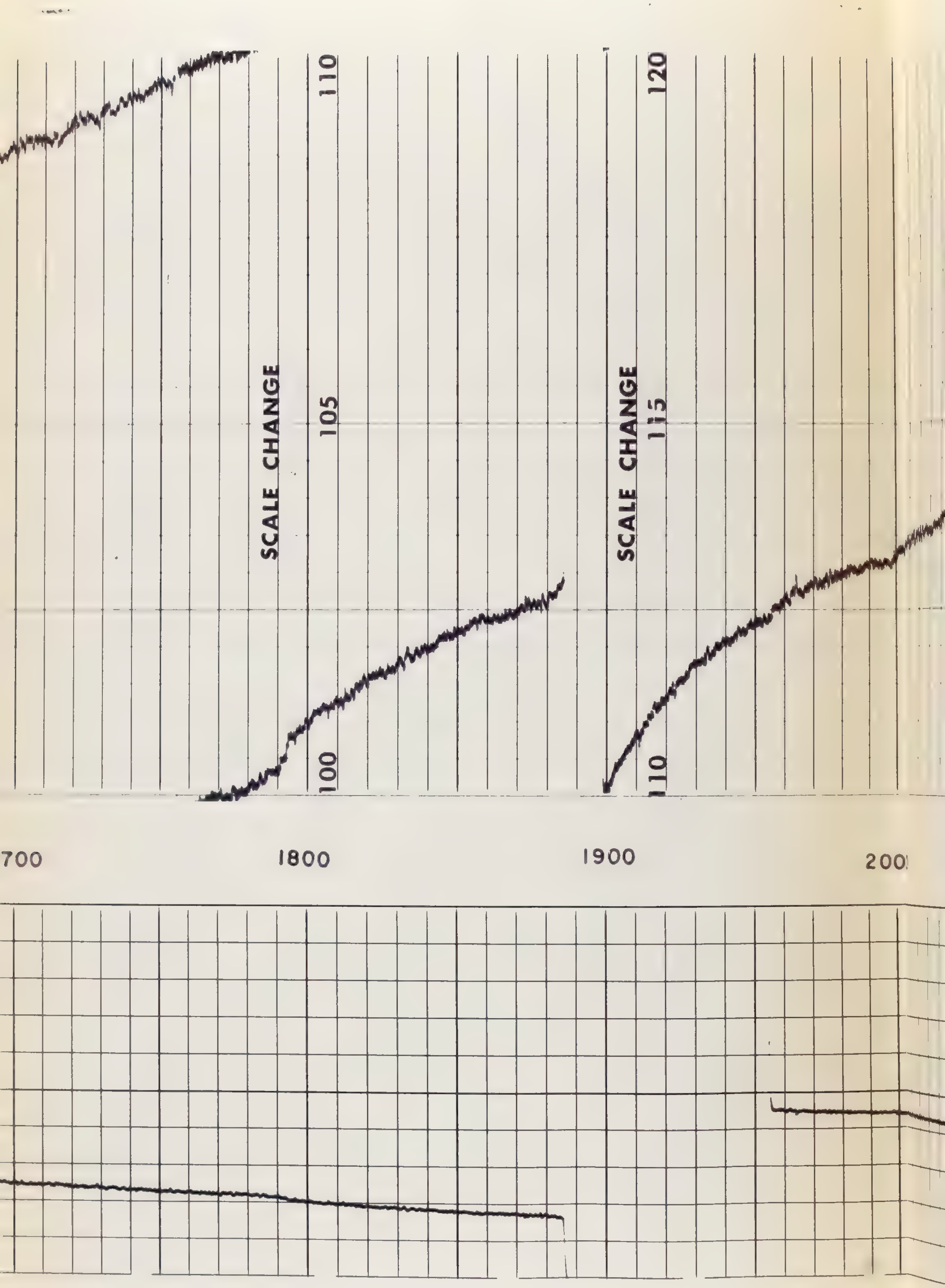

TEMPERATURE
200
300
400
REDUCED TEMPERATURE

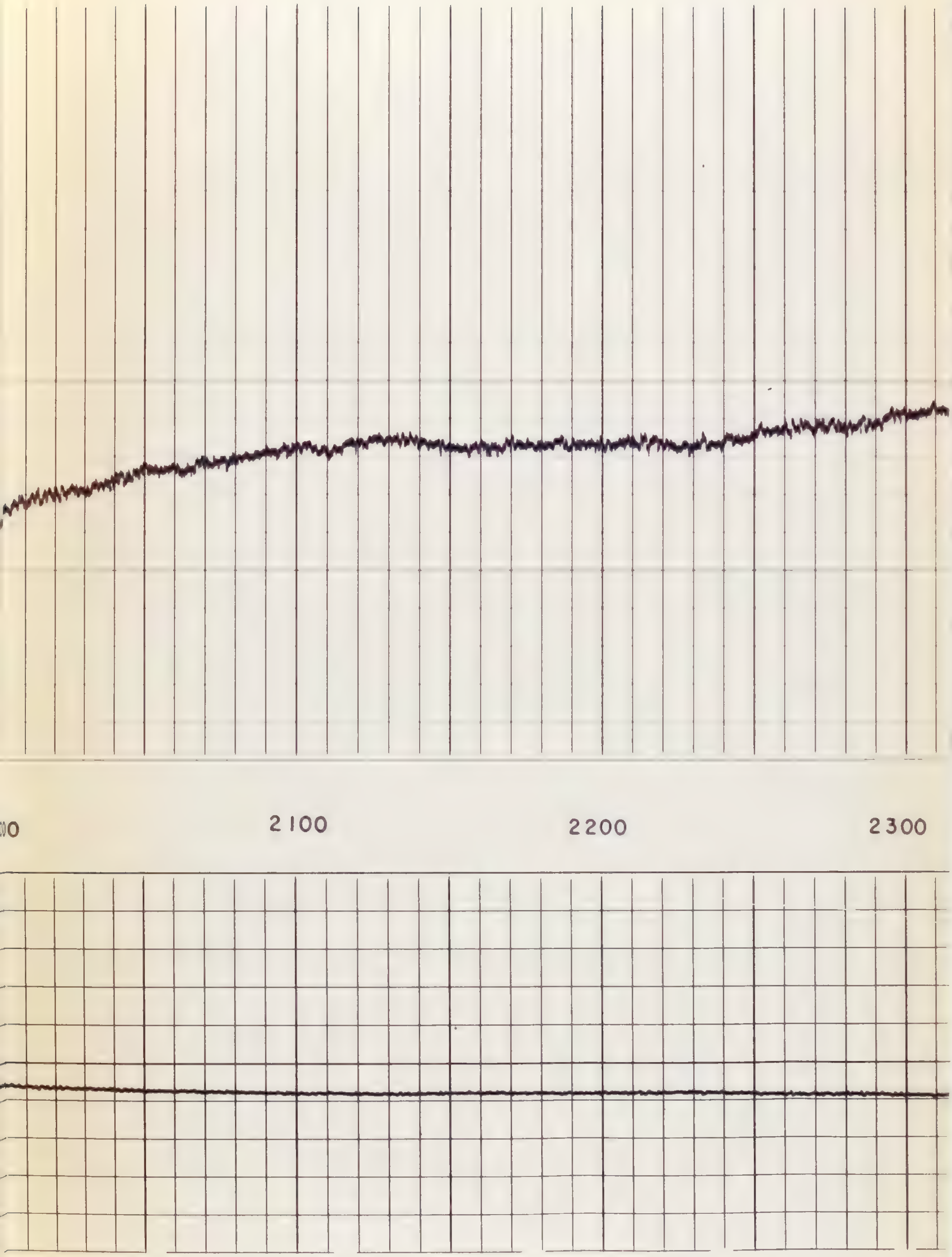

100
95
90
SCALE CHANGE
500
600
700
80

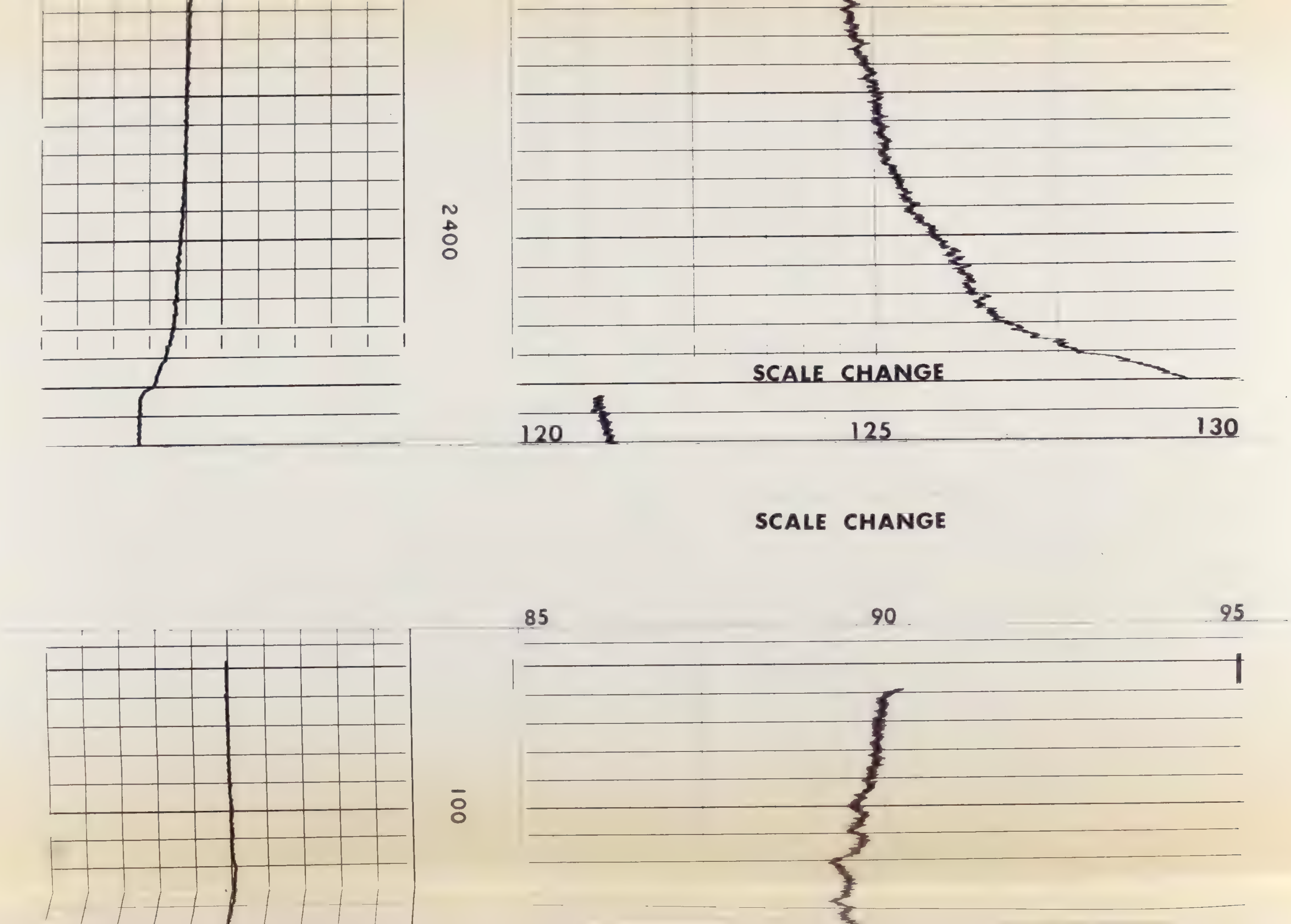

800
900
1000

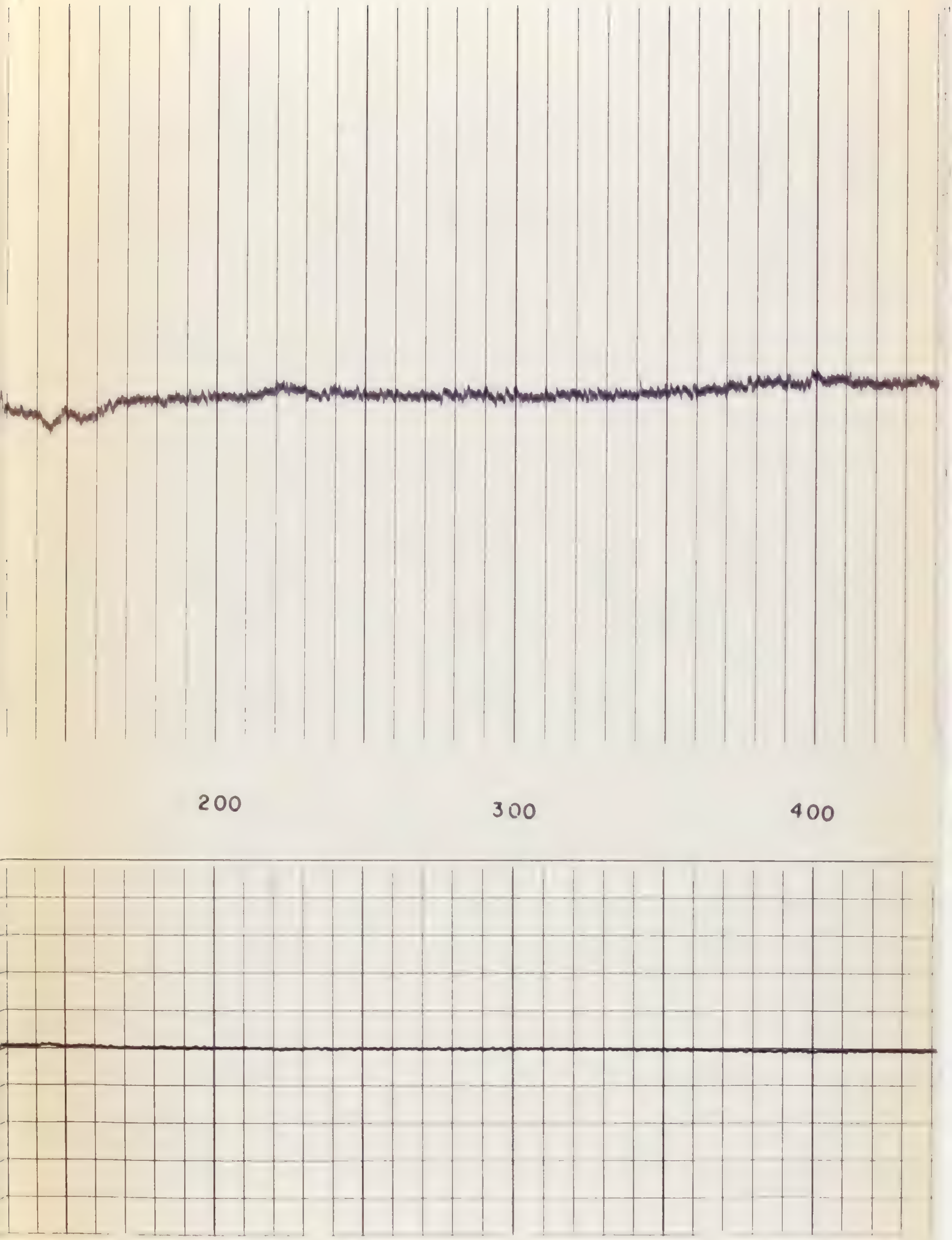

1100
1200
1300
1400

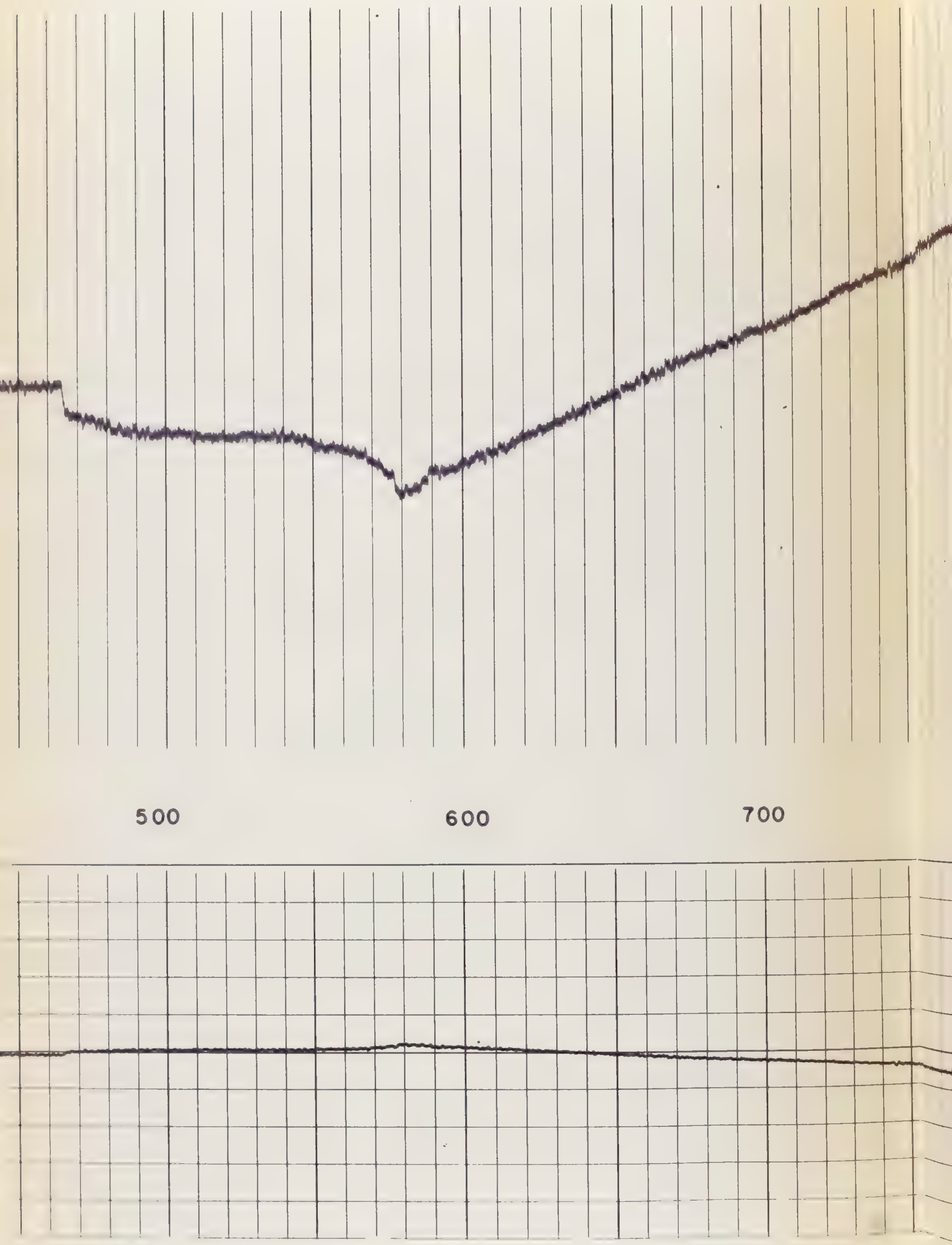

1400
1500
1600


110
105
100
SCALE CHANGE
120
115
110
SCALE CHANGE
700
1800
1900
200


00
2100
2200
2300


2400
SCALE CHANGE
120
125
130
SCALE CHANGE
85
90
95
100


200
300
400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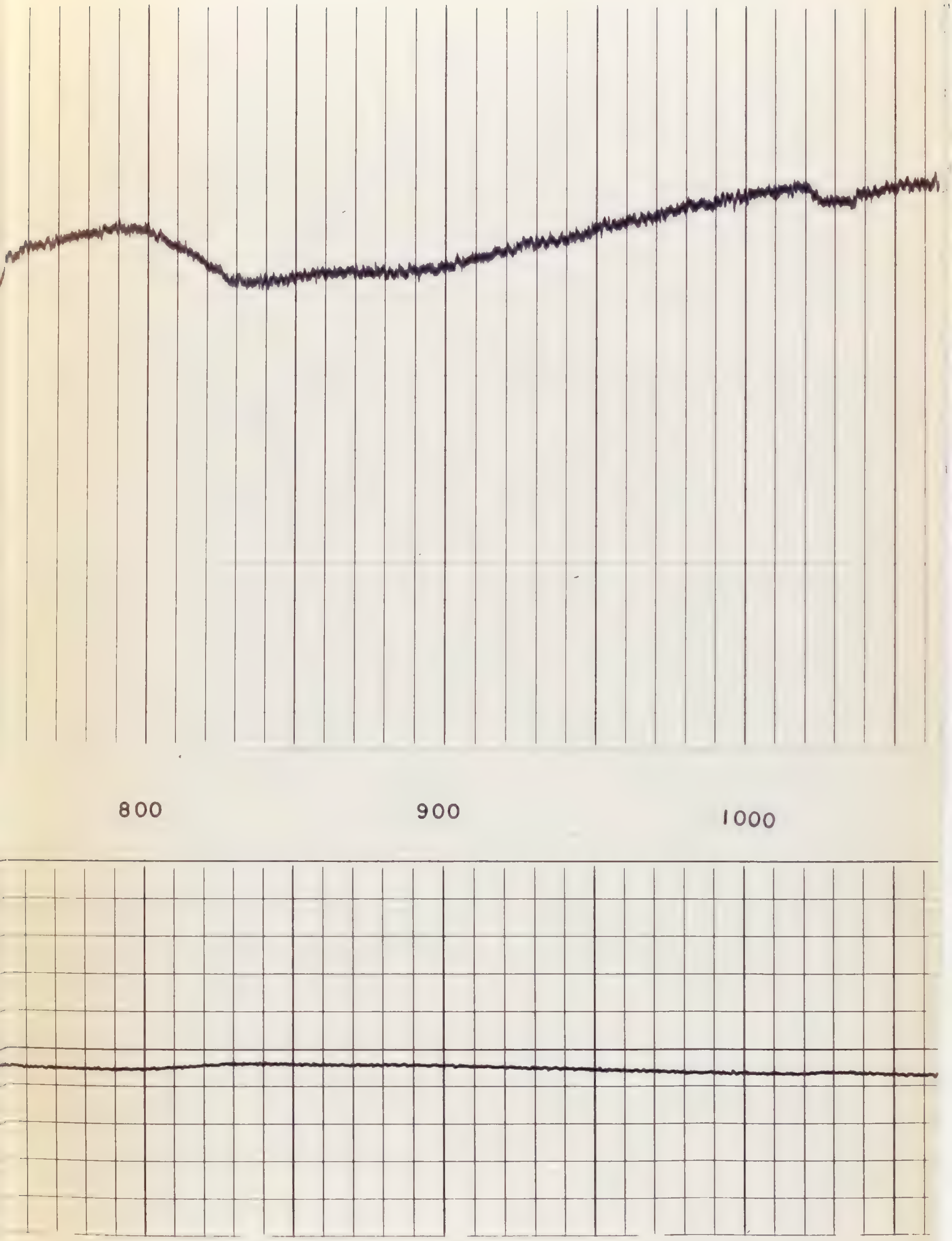
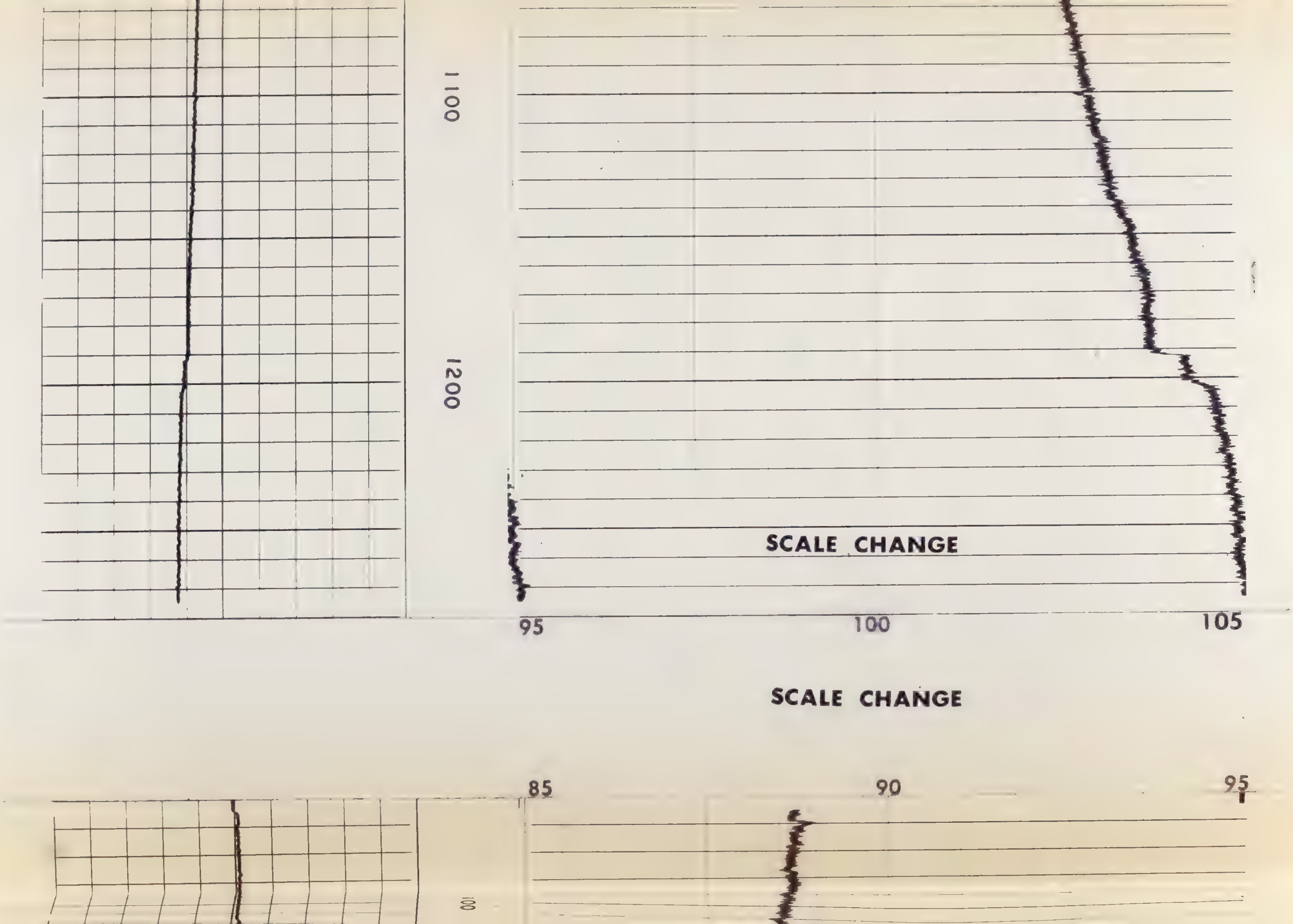
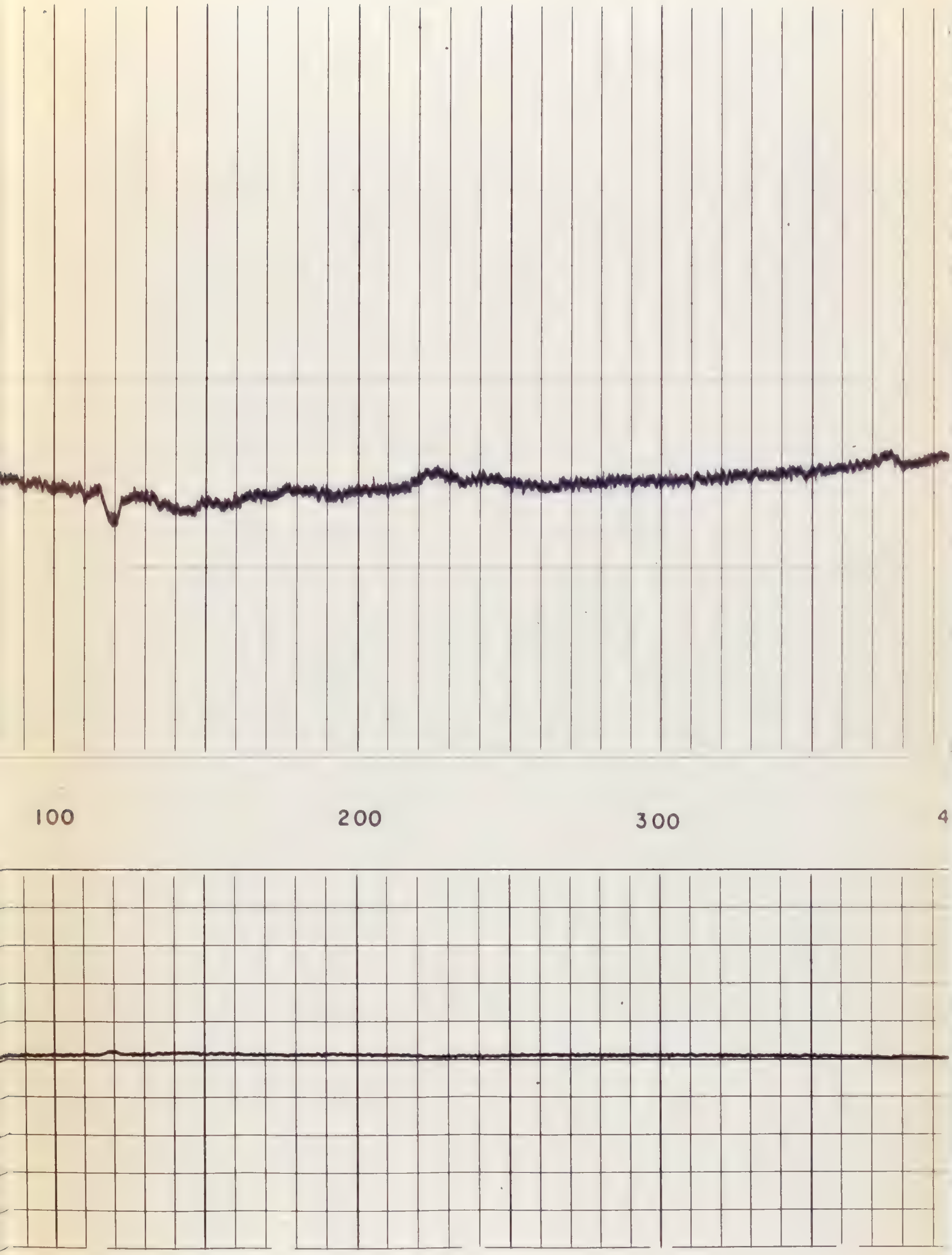
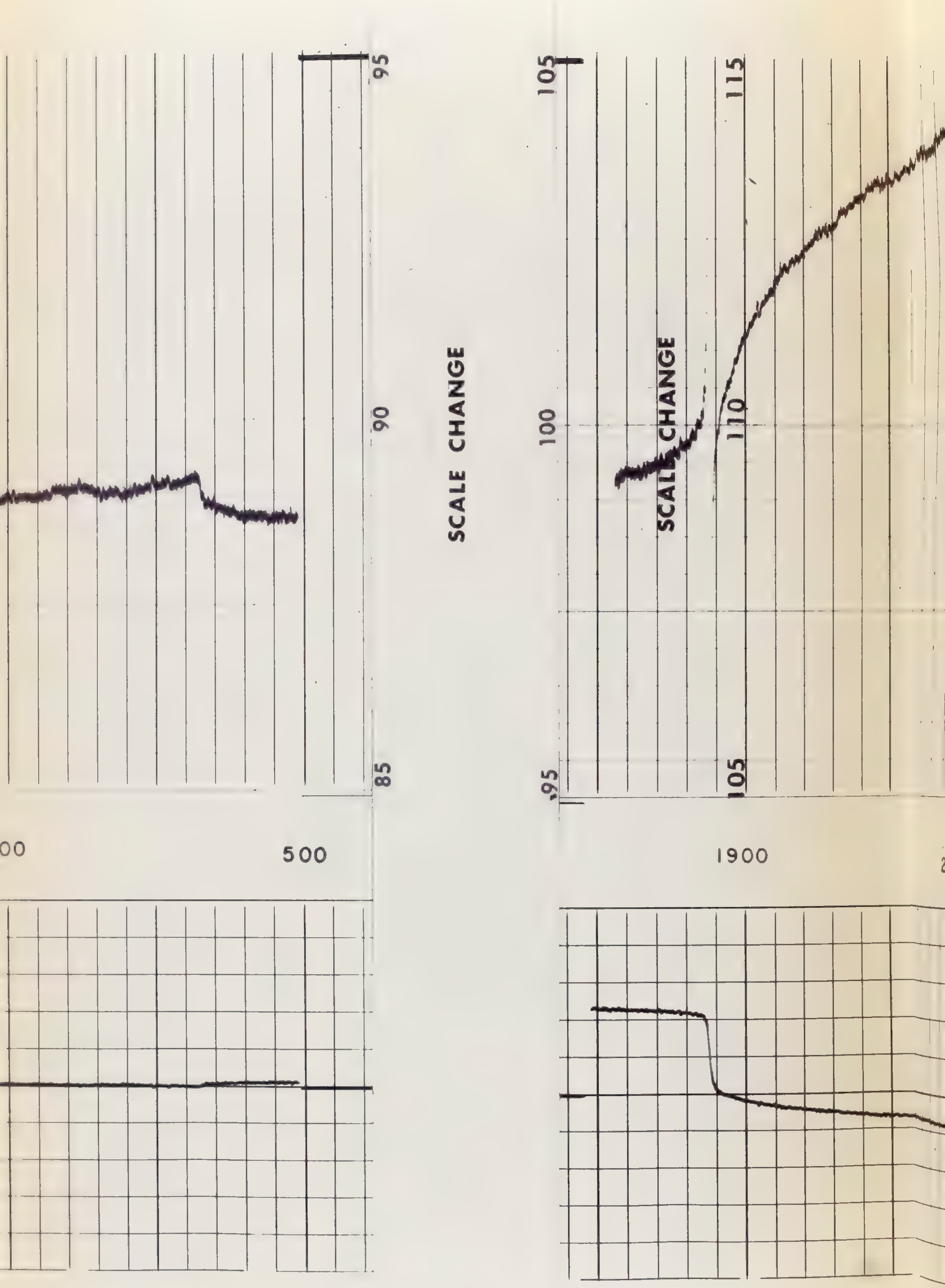
600
700

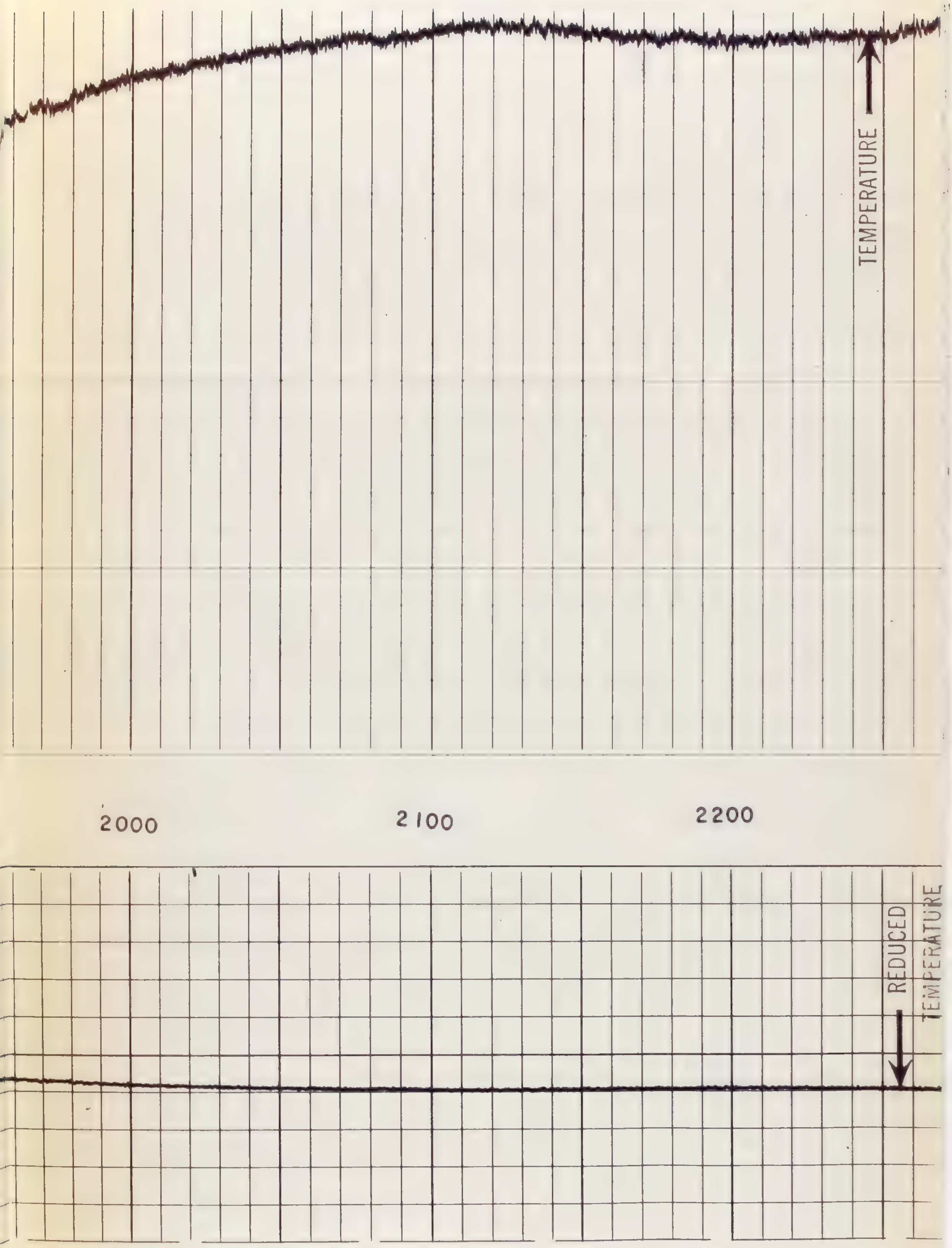

800
900
1000

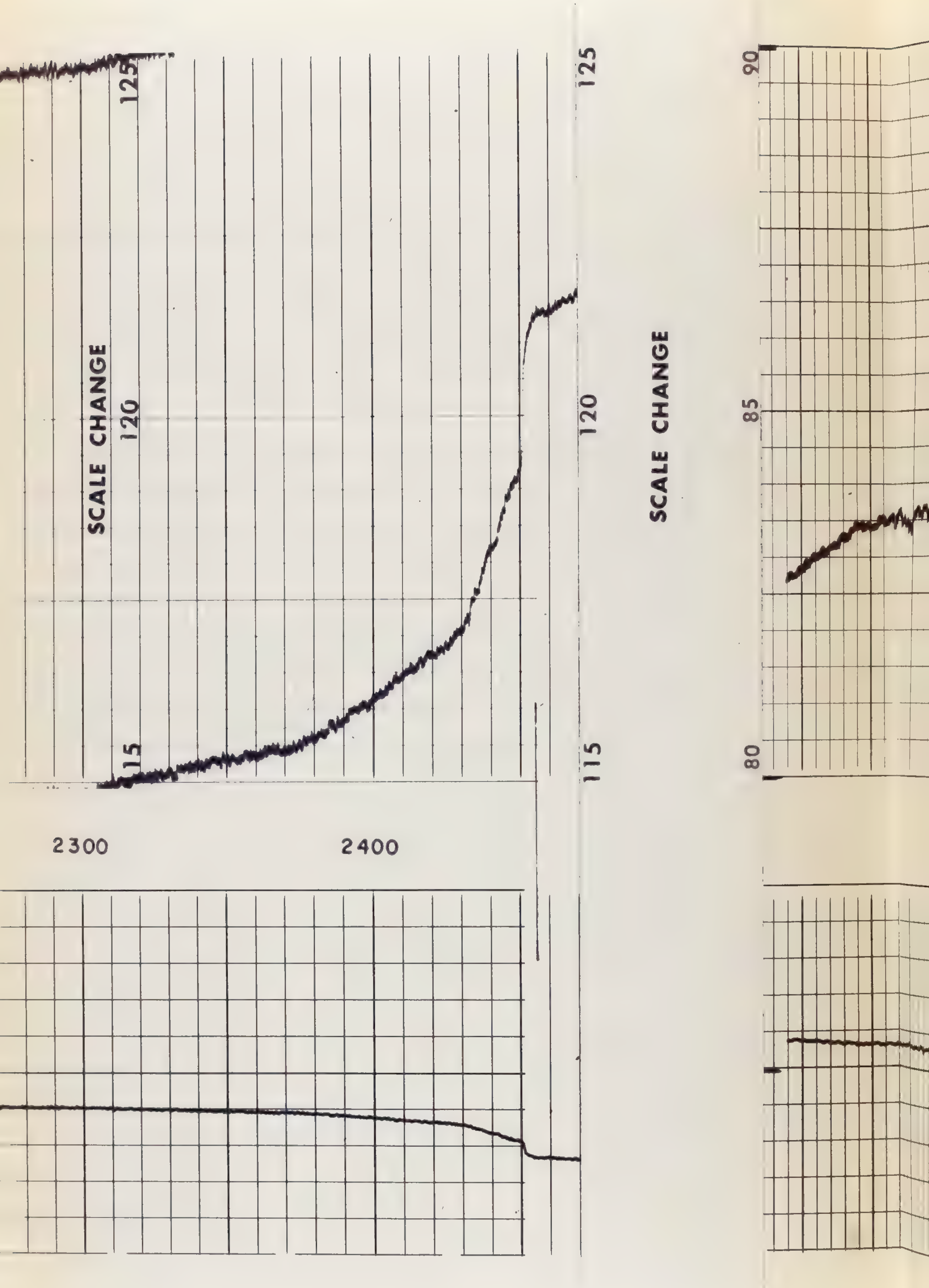

1100
1200
SCALE CHANGE
95
100
105
SCALE CHANGE
85
90
95
100



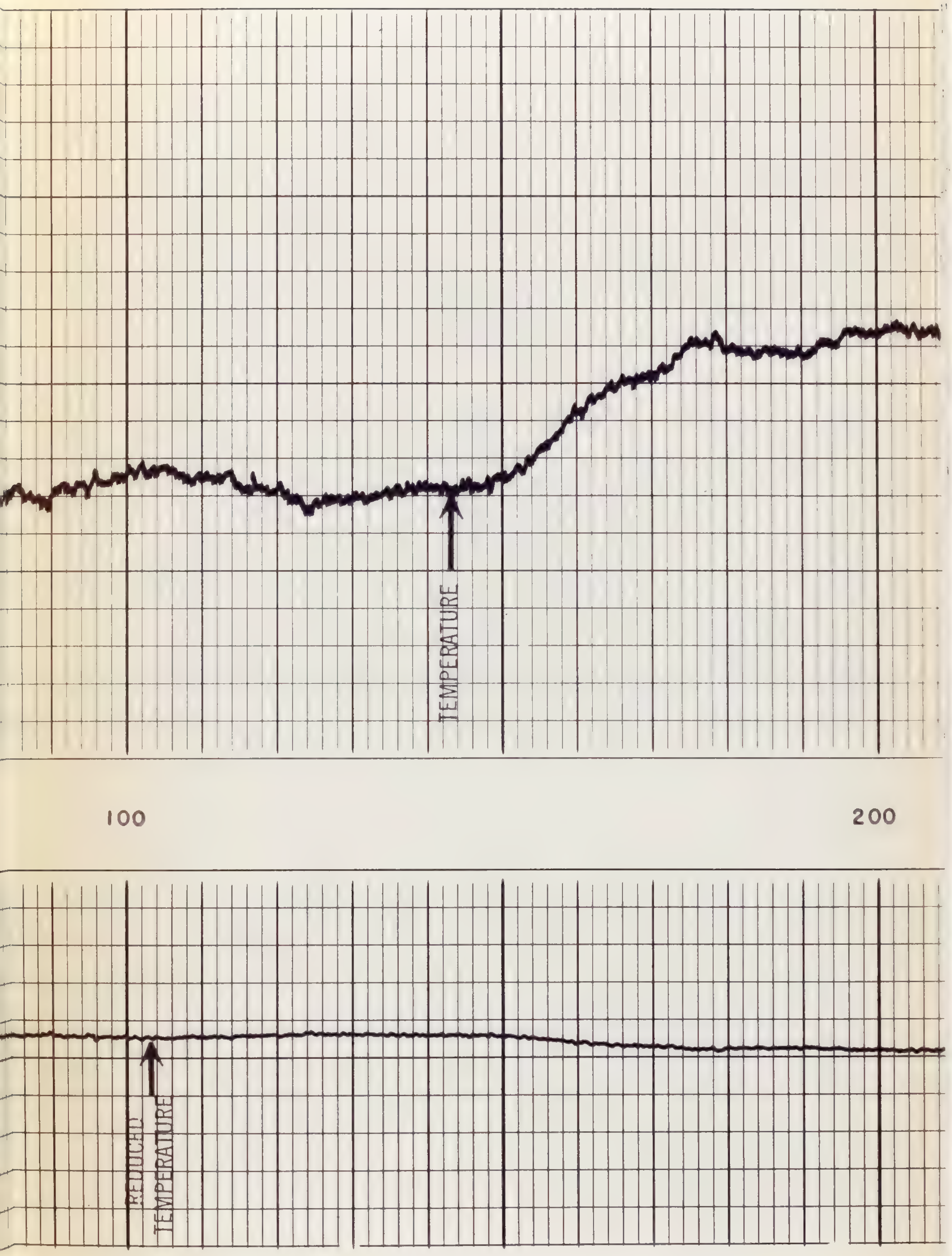
100
200
300
4

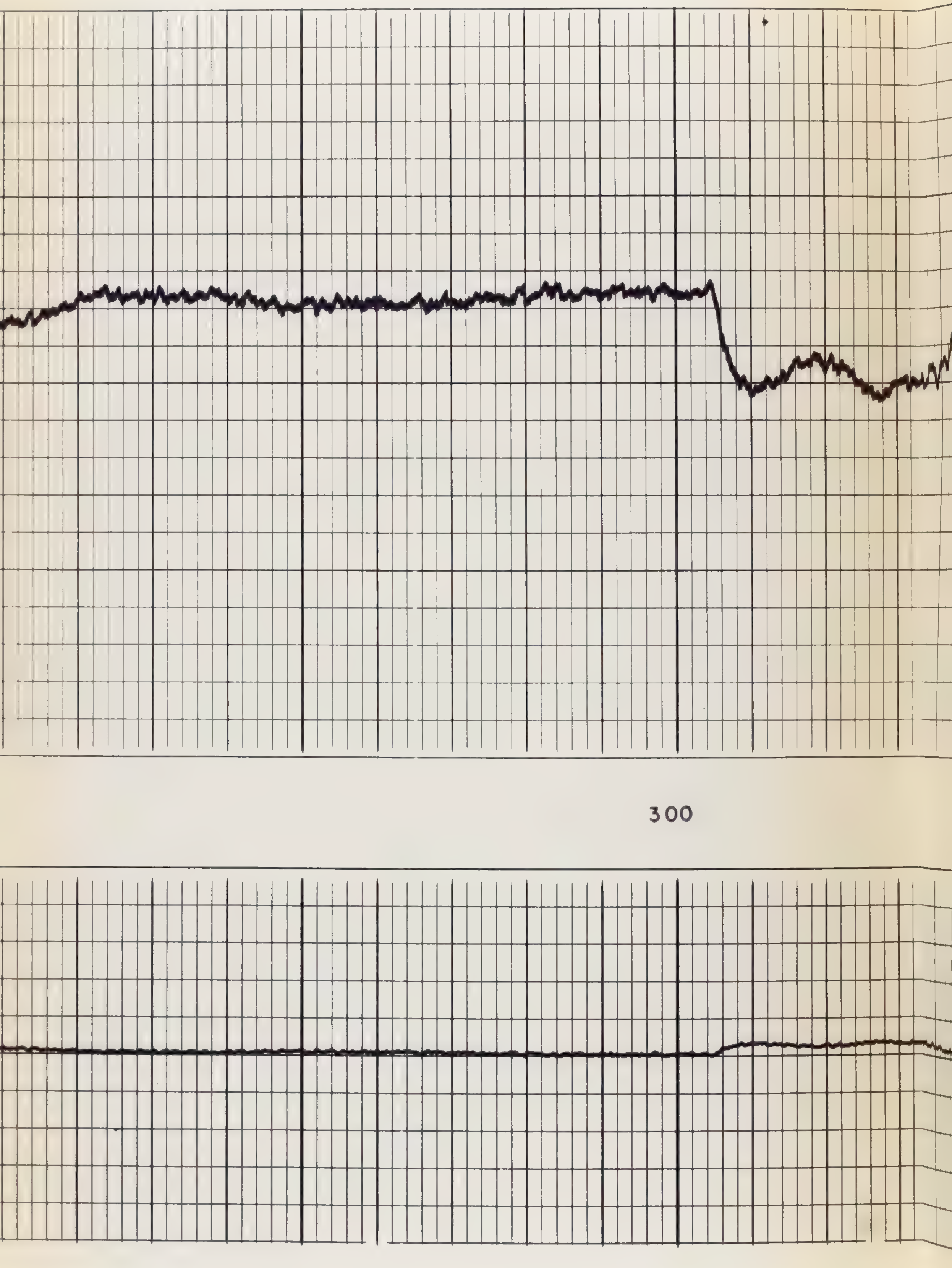

95
90
85
SCALE CHANGE
105
100
.95
115
110
105
SCALE CHANGE
00
500
1900


TEMPERATURE
2000
2100
2200
REDUCED TEMPERATURE



SCALE CHANGE
125
120
115
125
120
115
2300
2400
SCALE CHANGE
90
85
80


TEMPERATURE
100
200
REDUCED TEMPERATURE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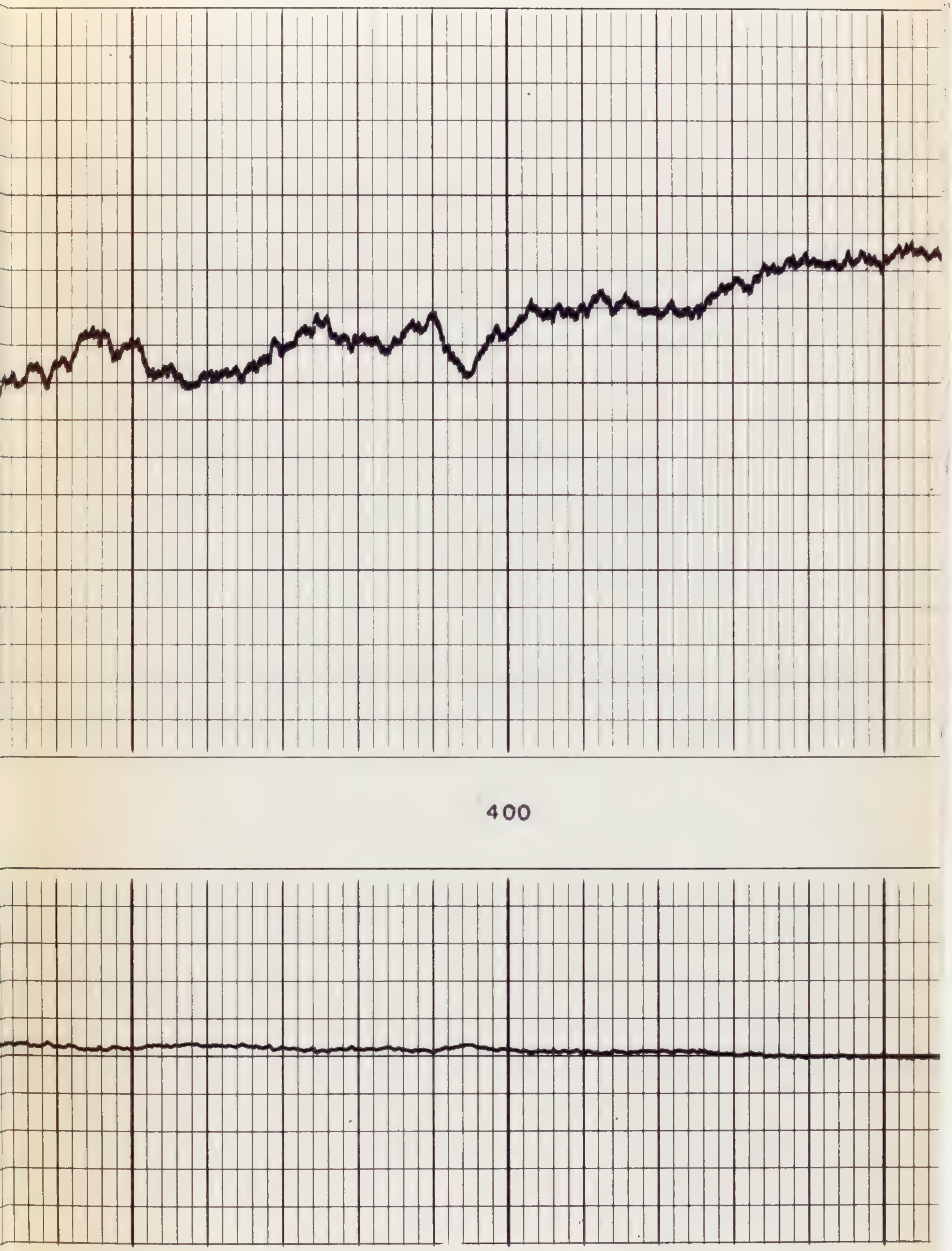
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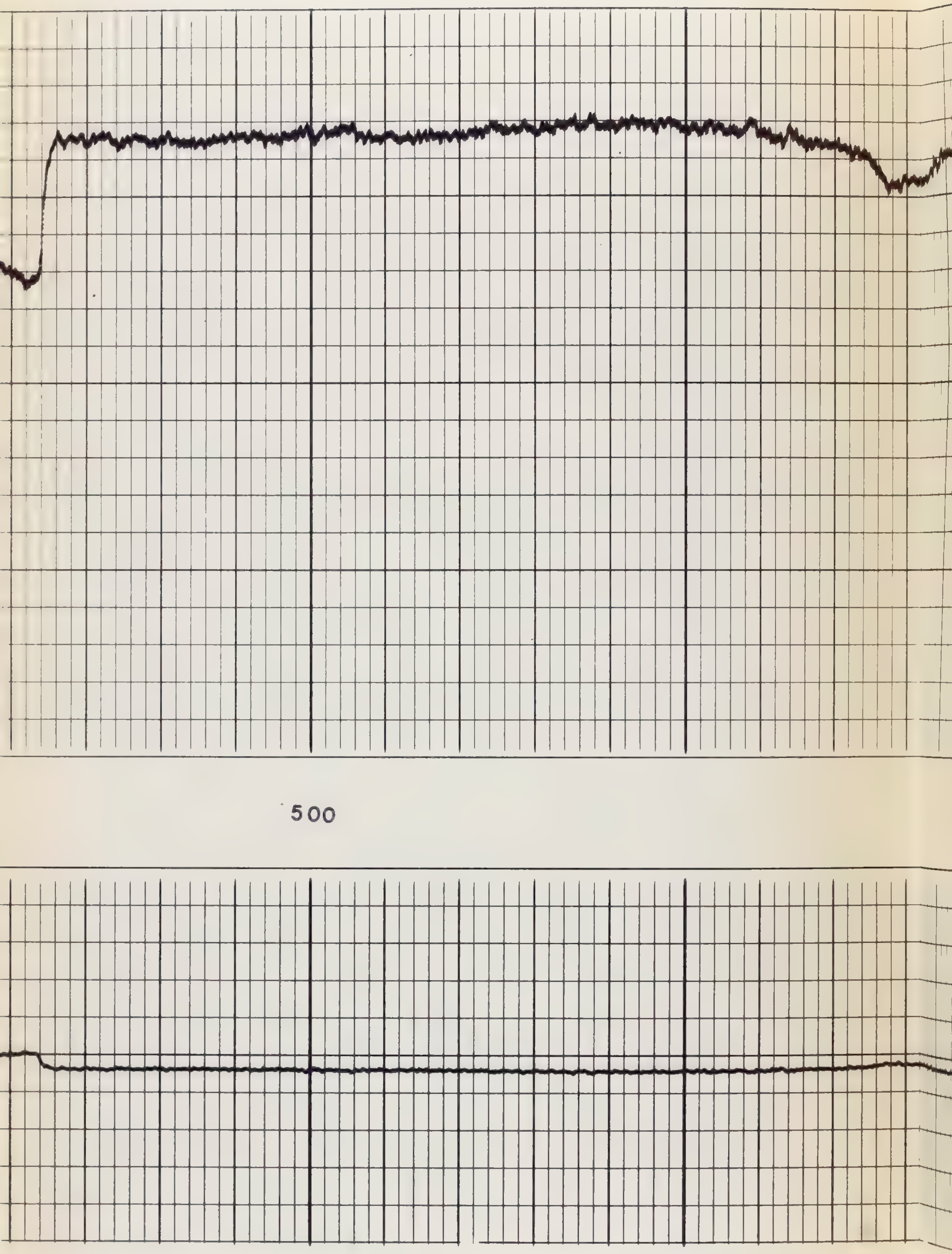
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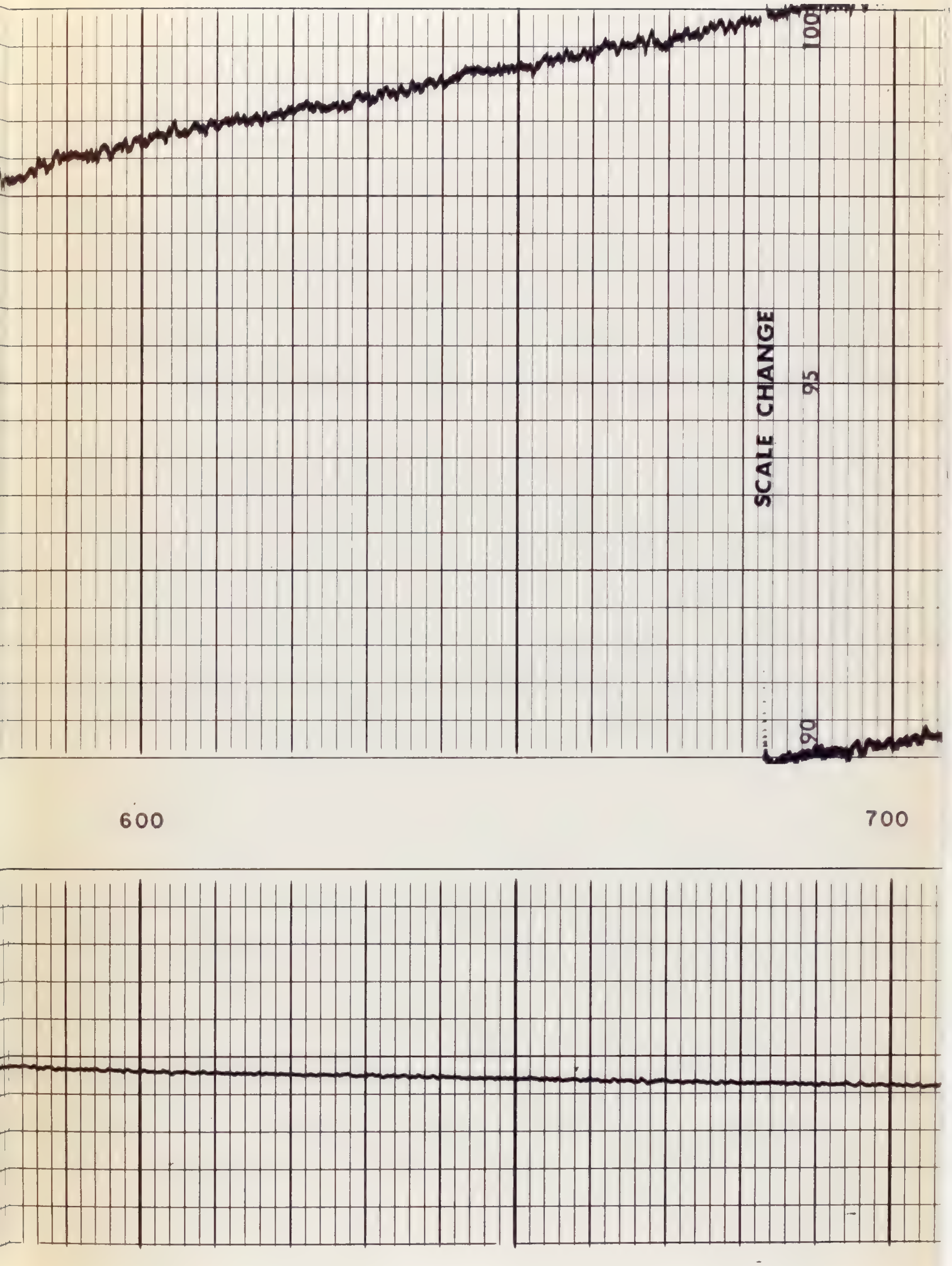
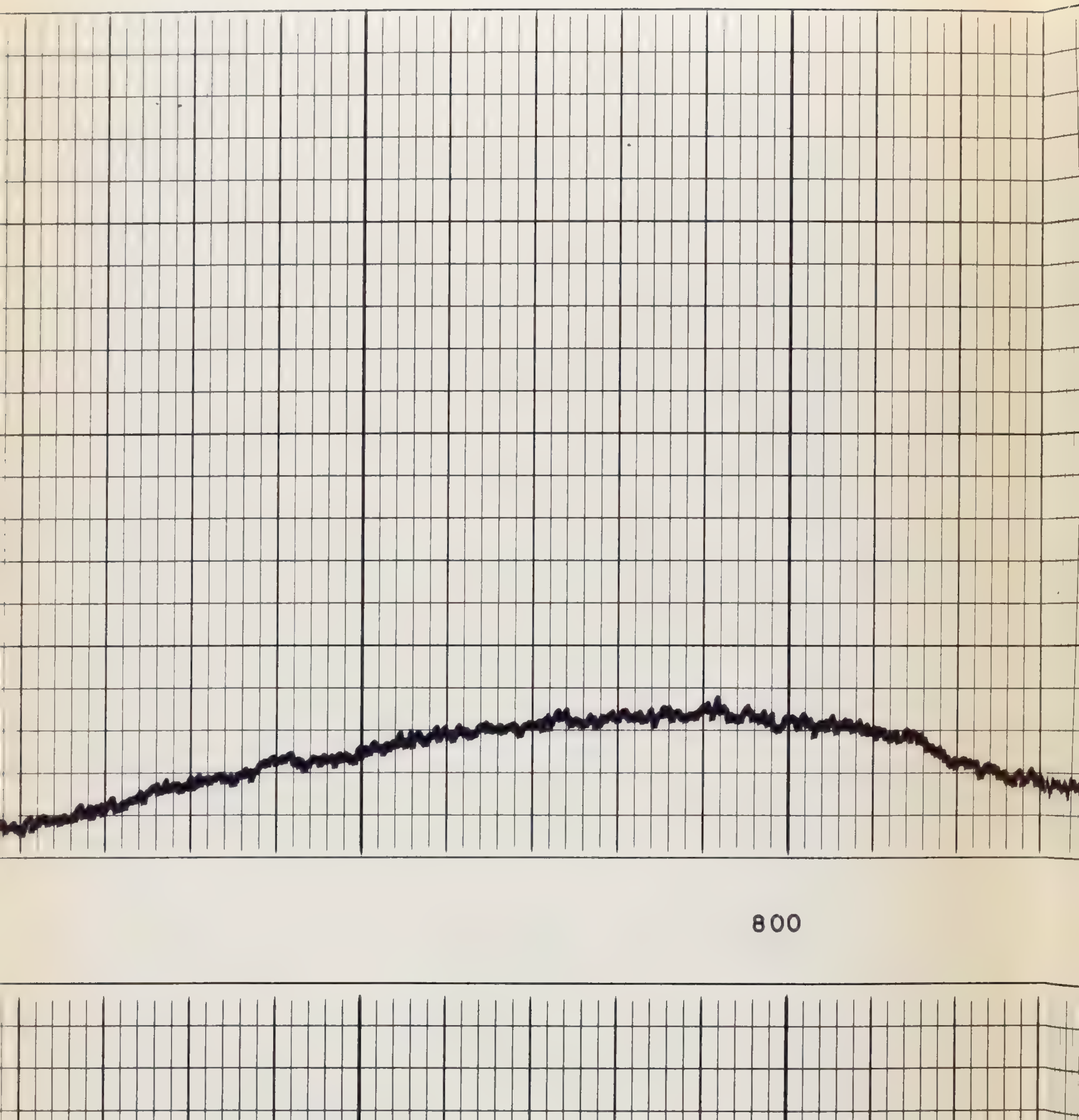

100
SCALE CHANGE
95
90
600
700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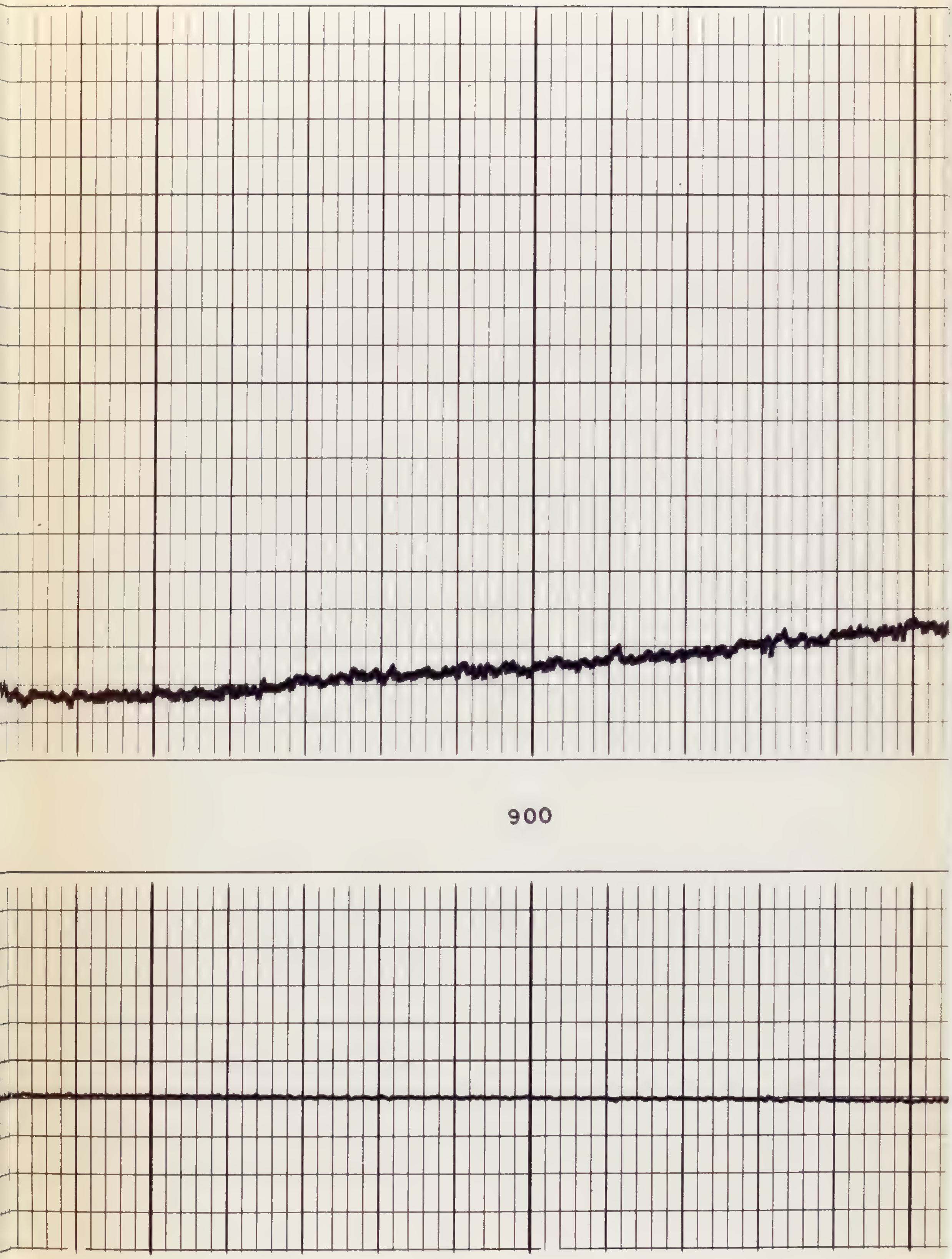
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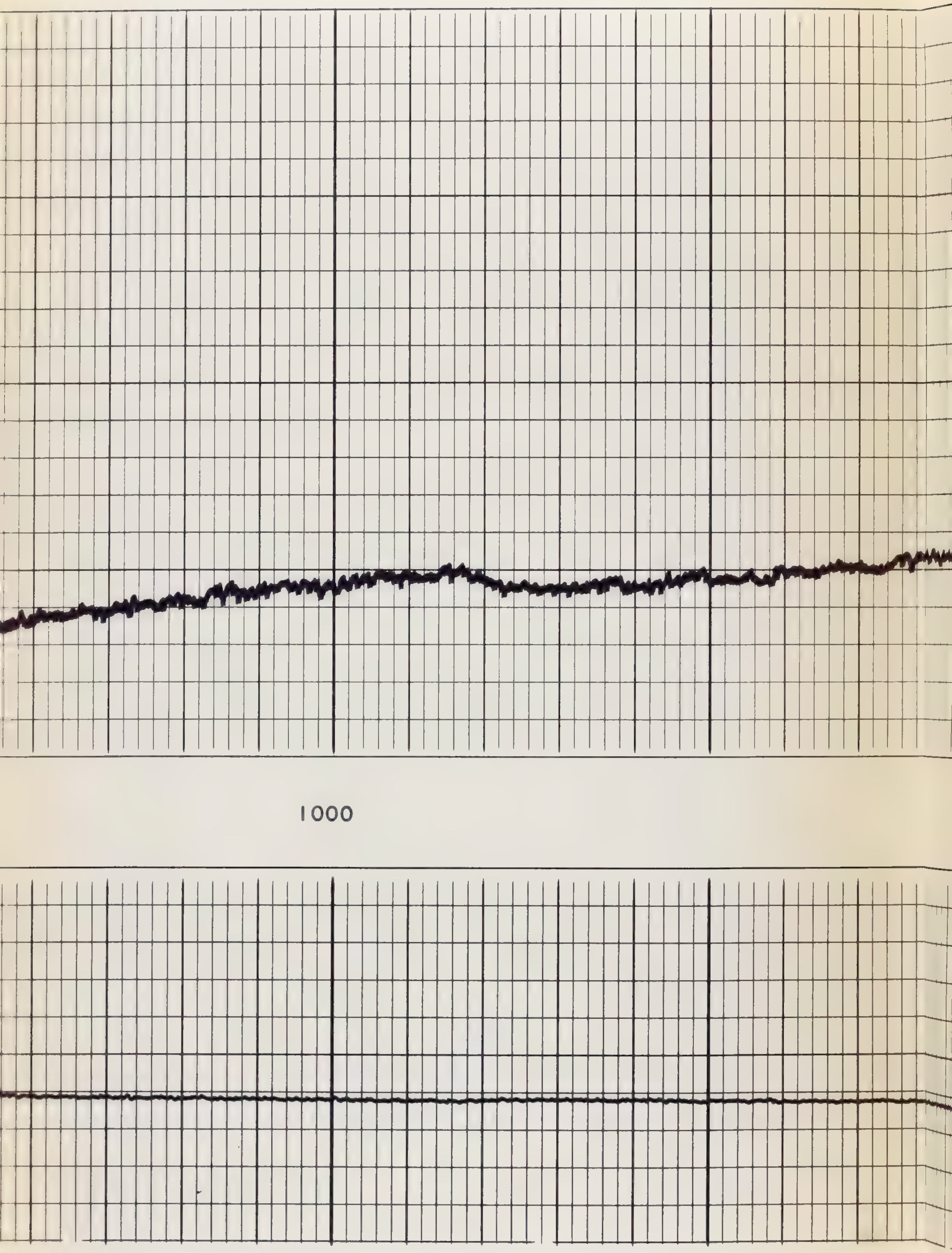
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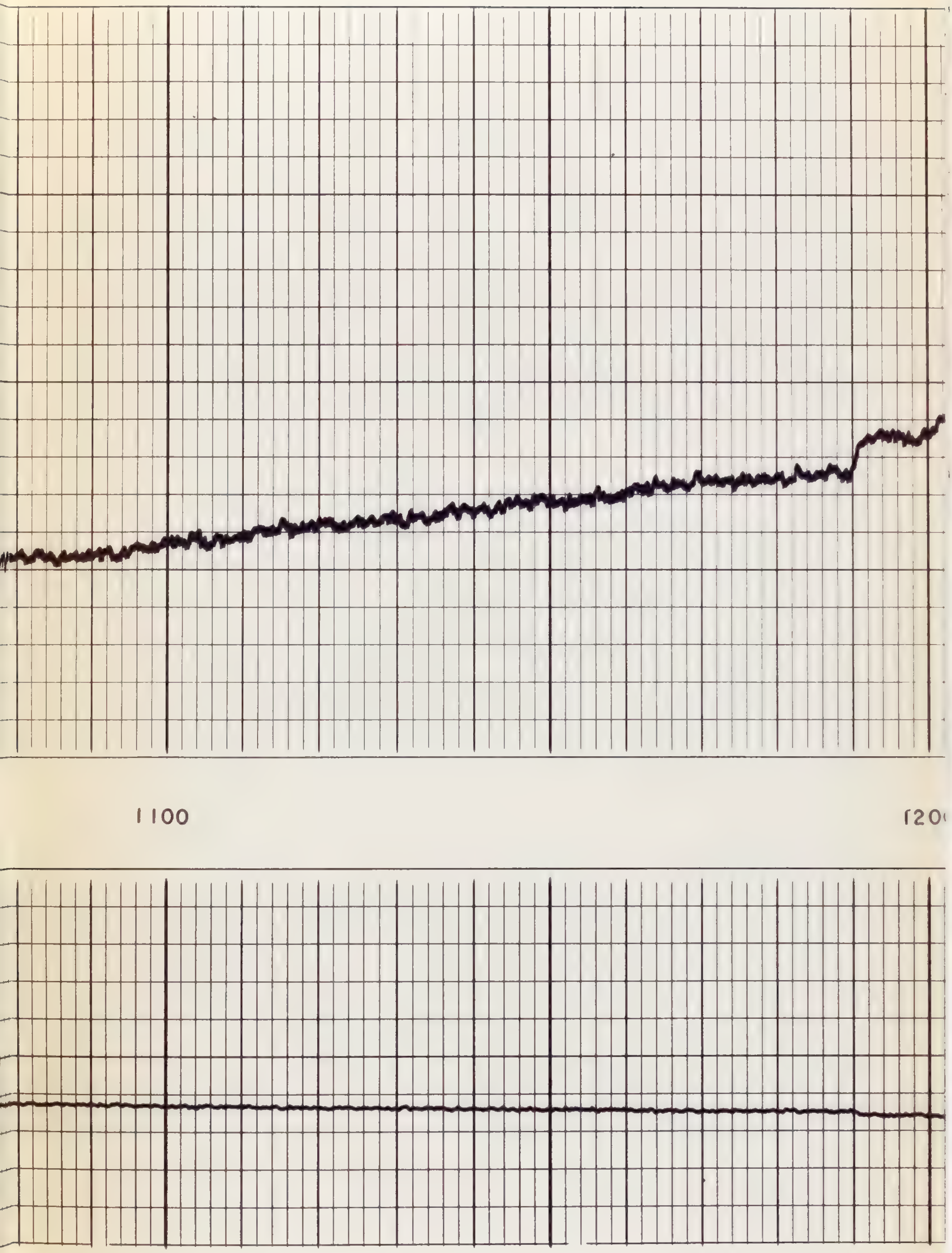
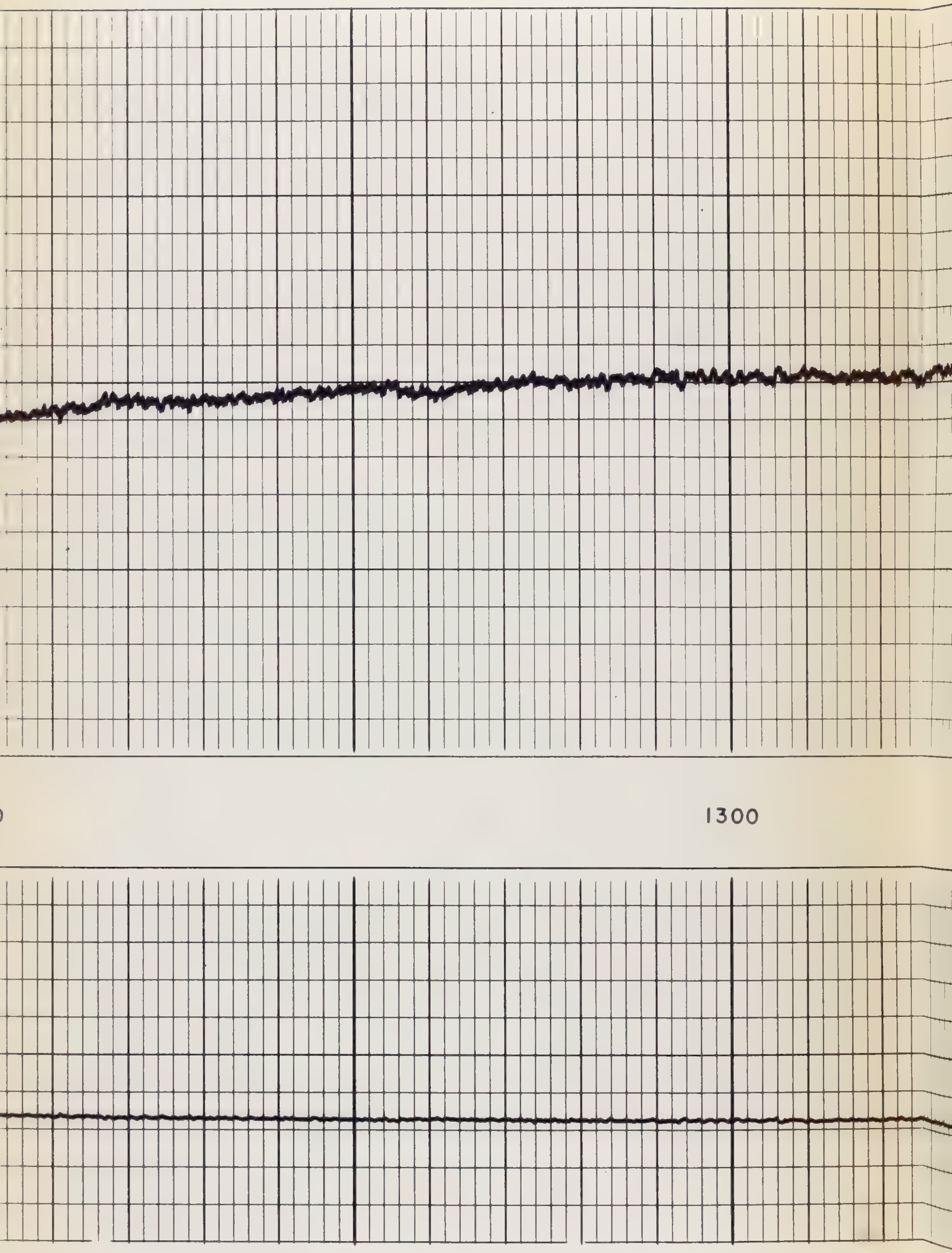

1100
120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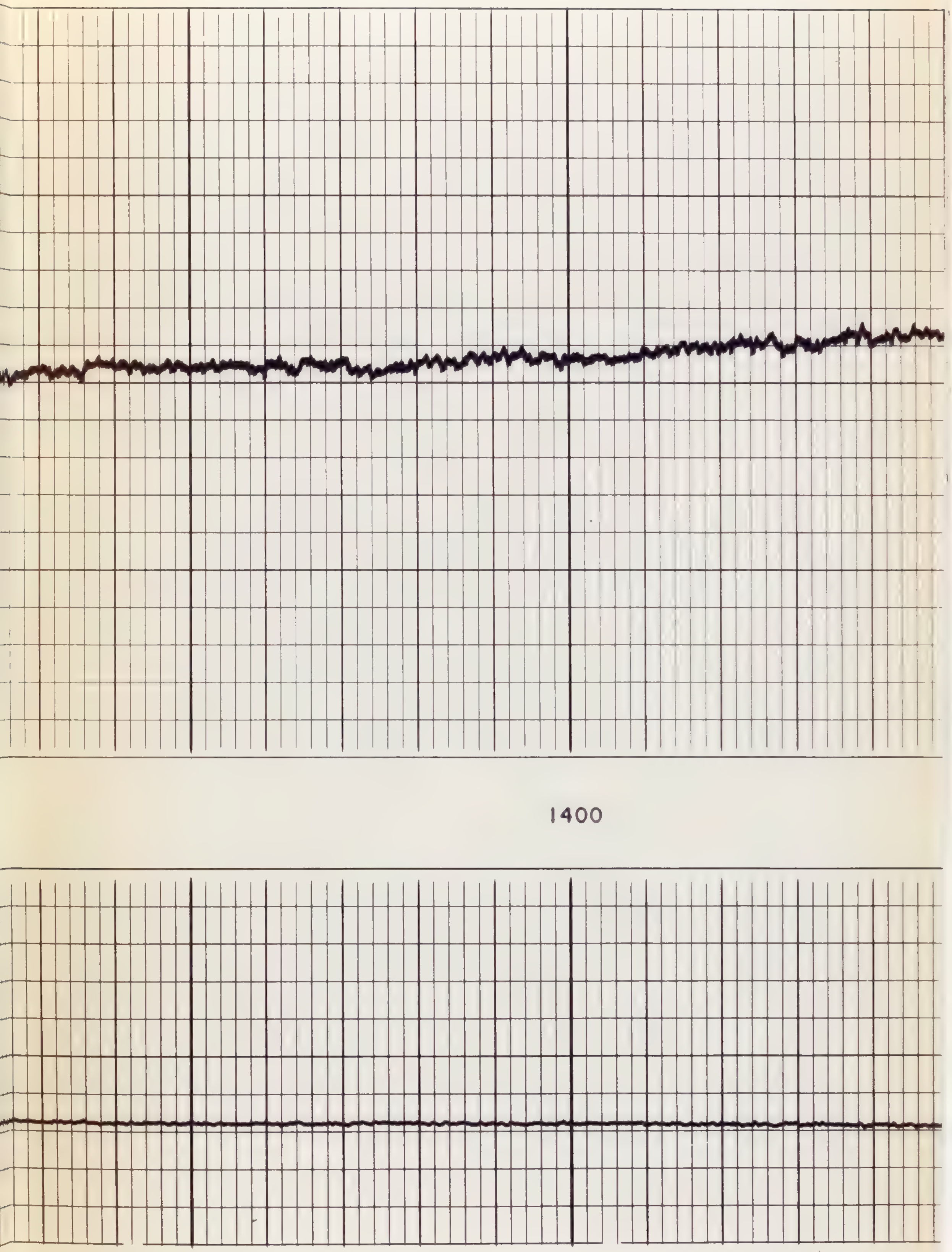
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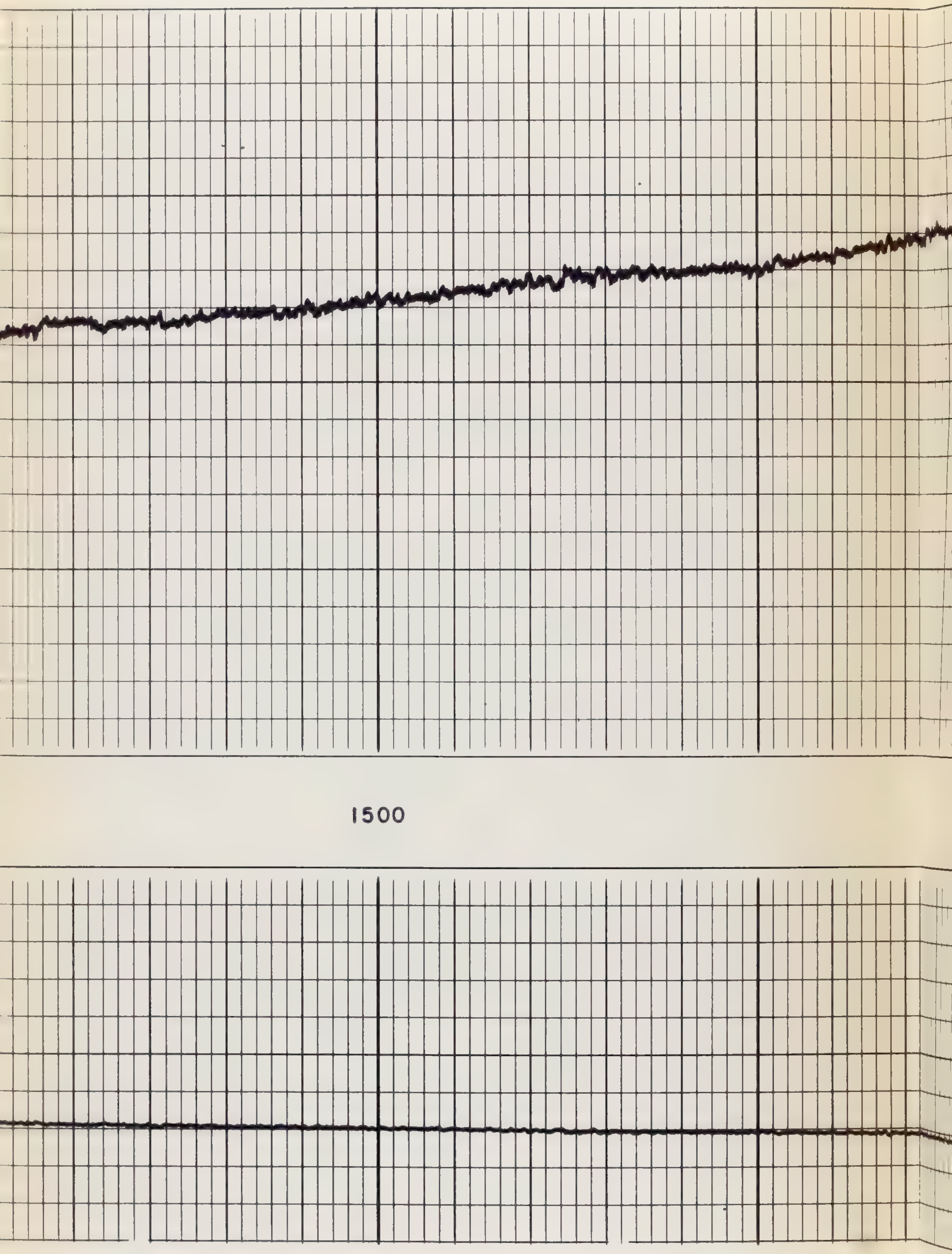
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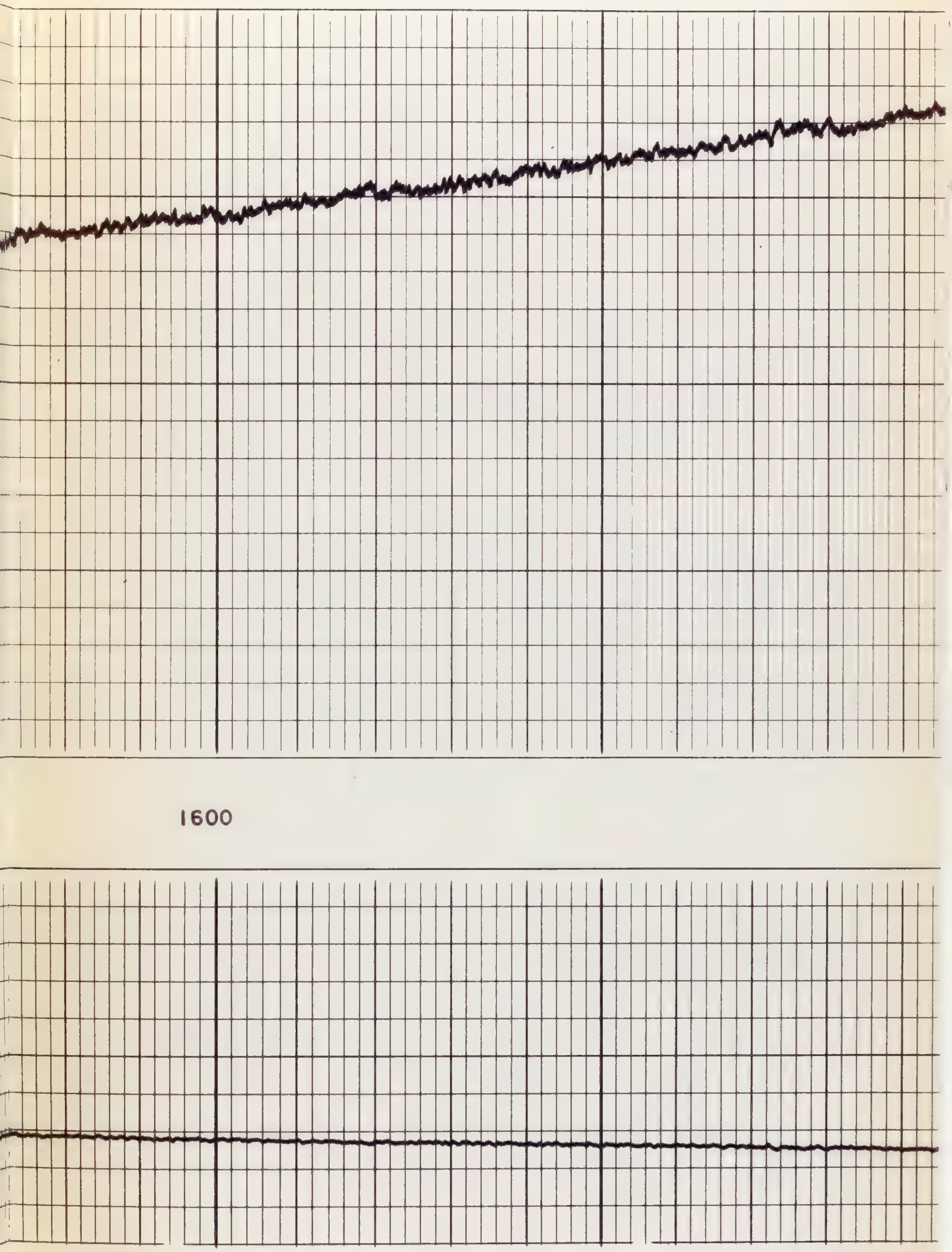
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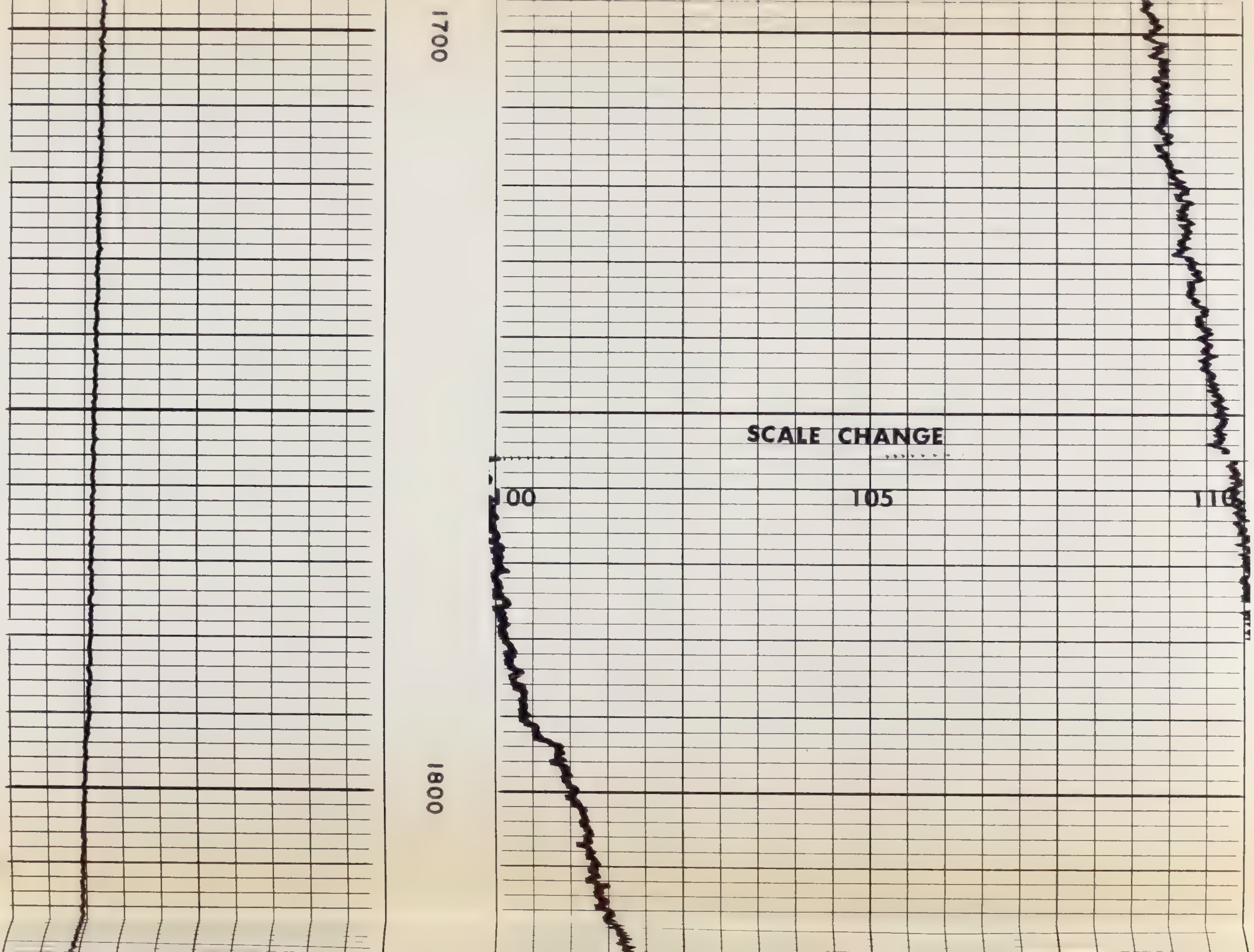
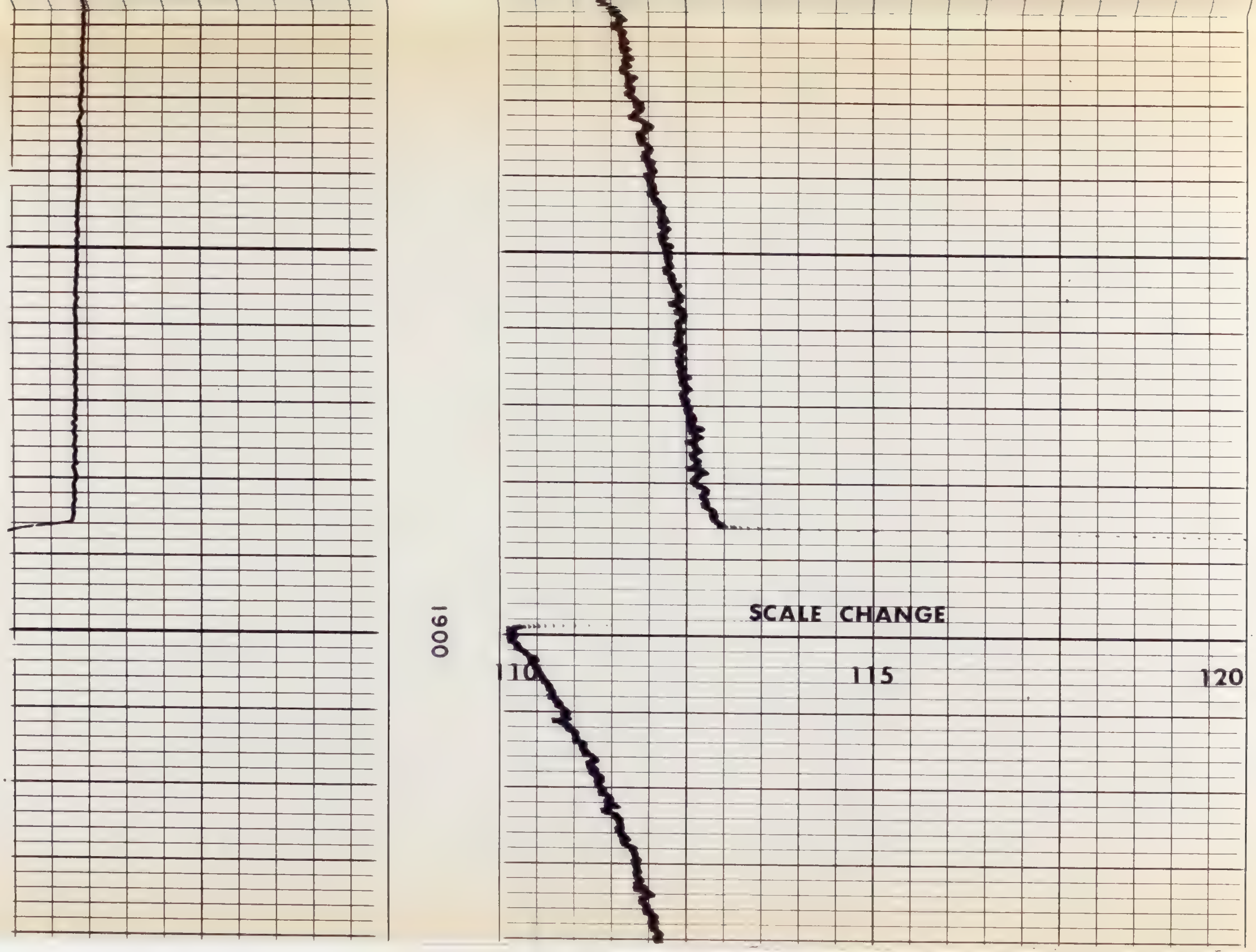
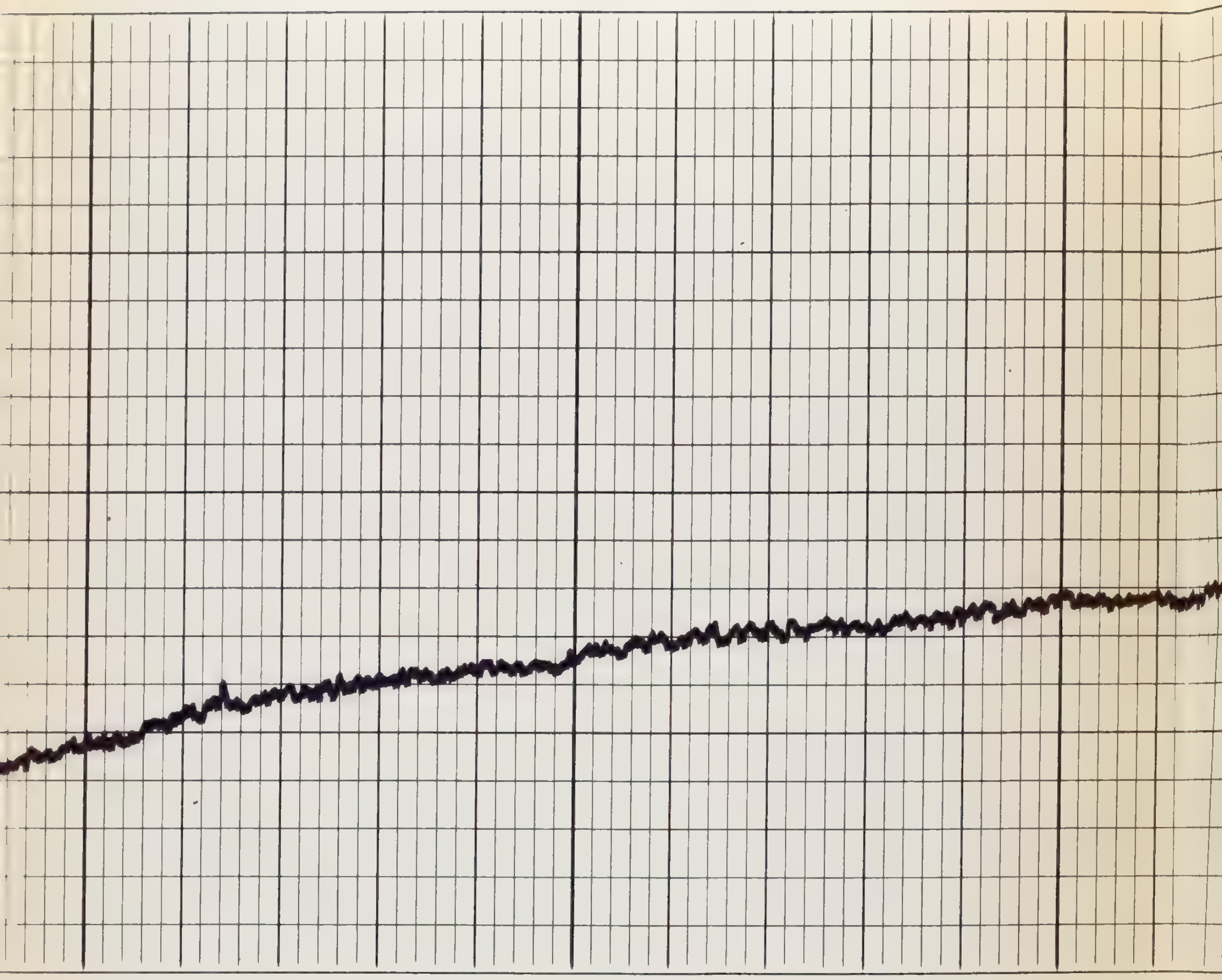

1700
1800
SCALE CHANGE
100
105
110


1900
SCALE CHANGE
110
115
120



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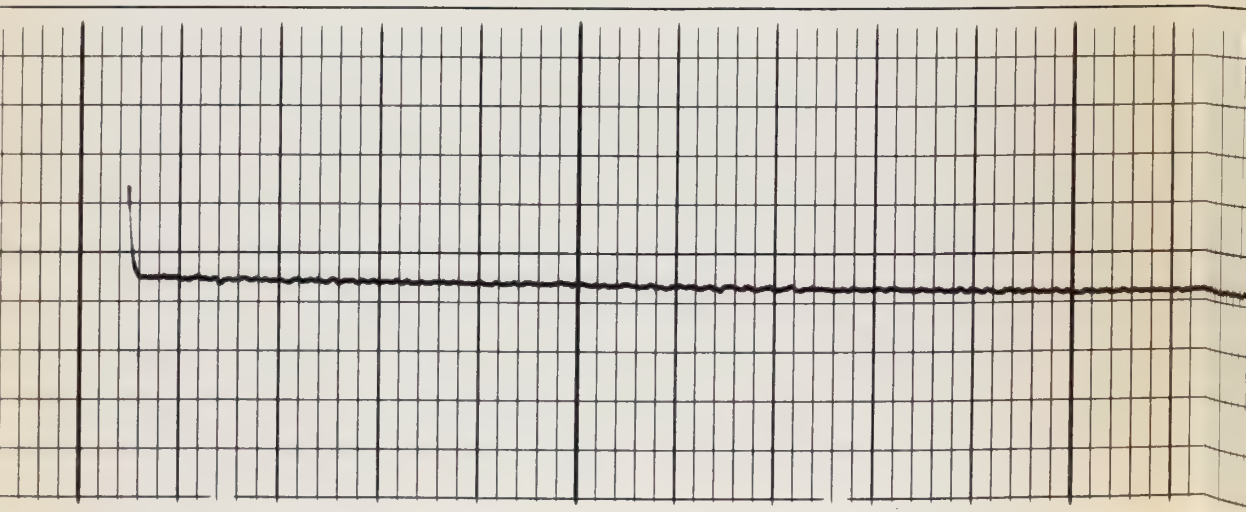
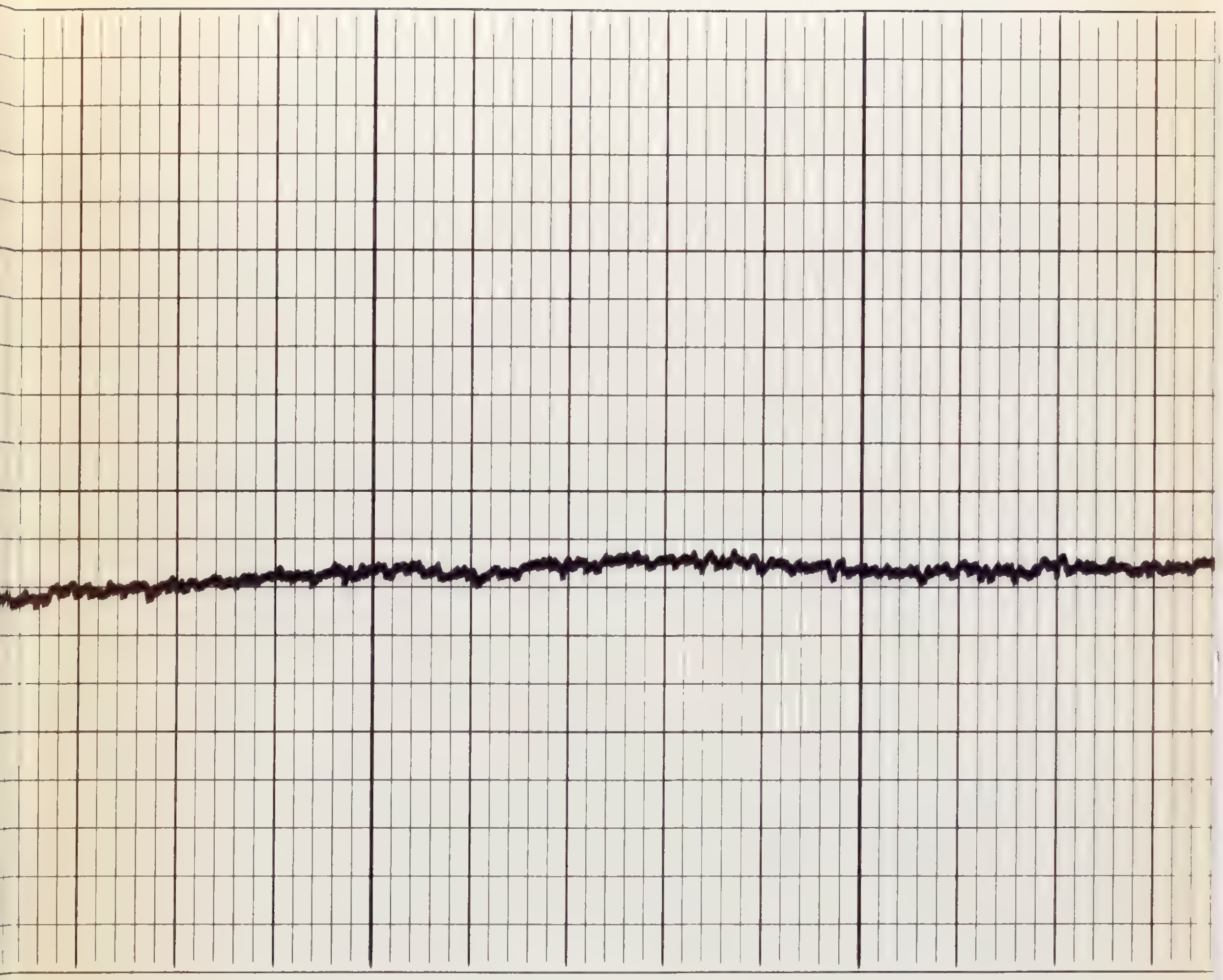
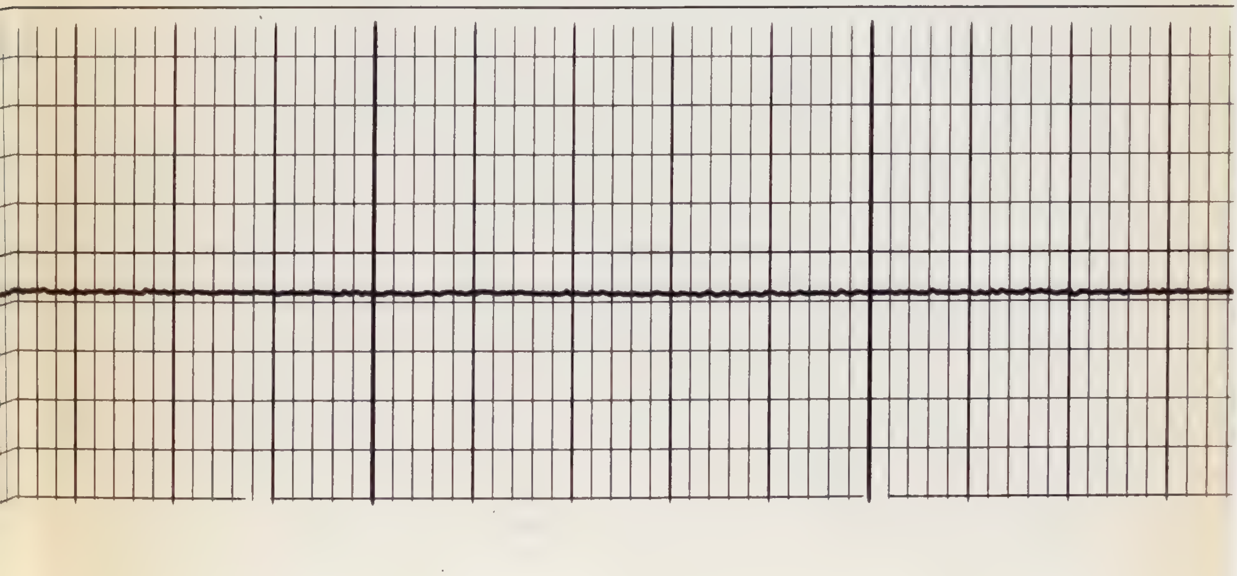
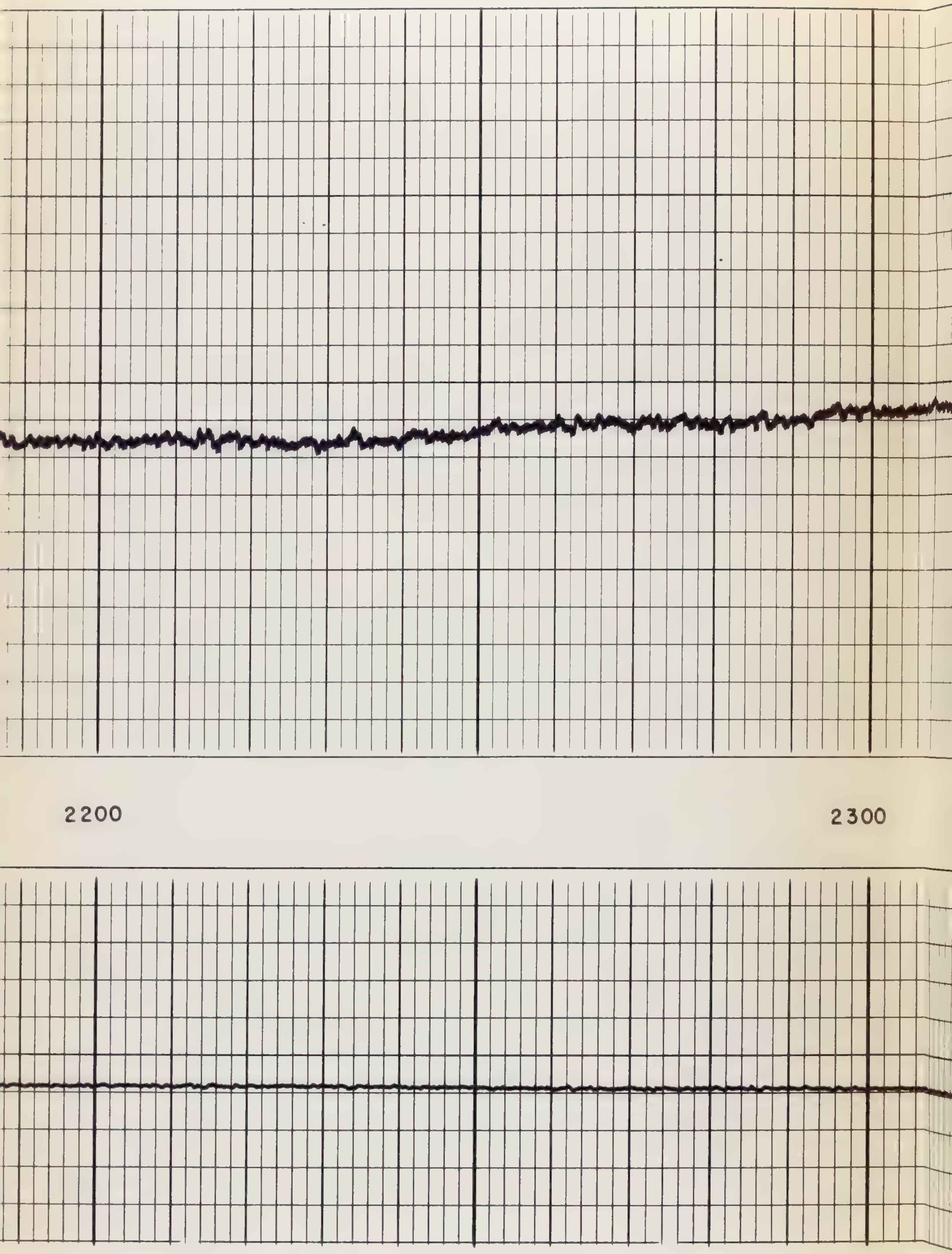




2100

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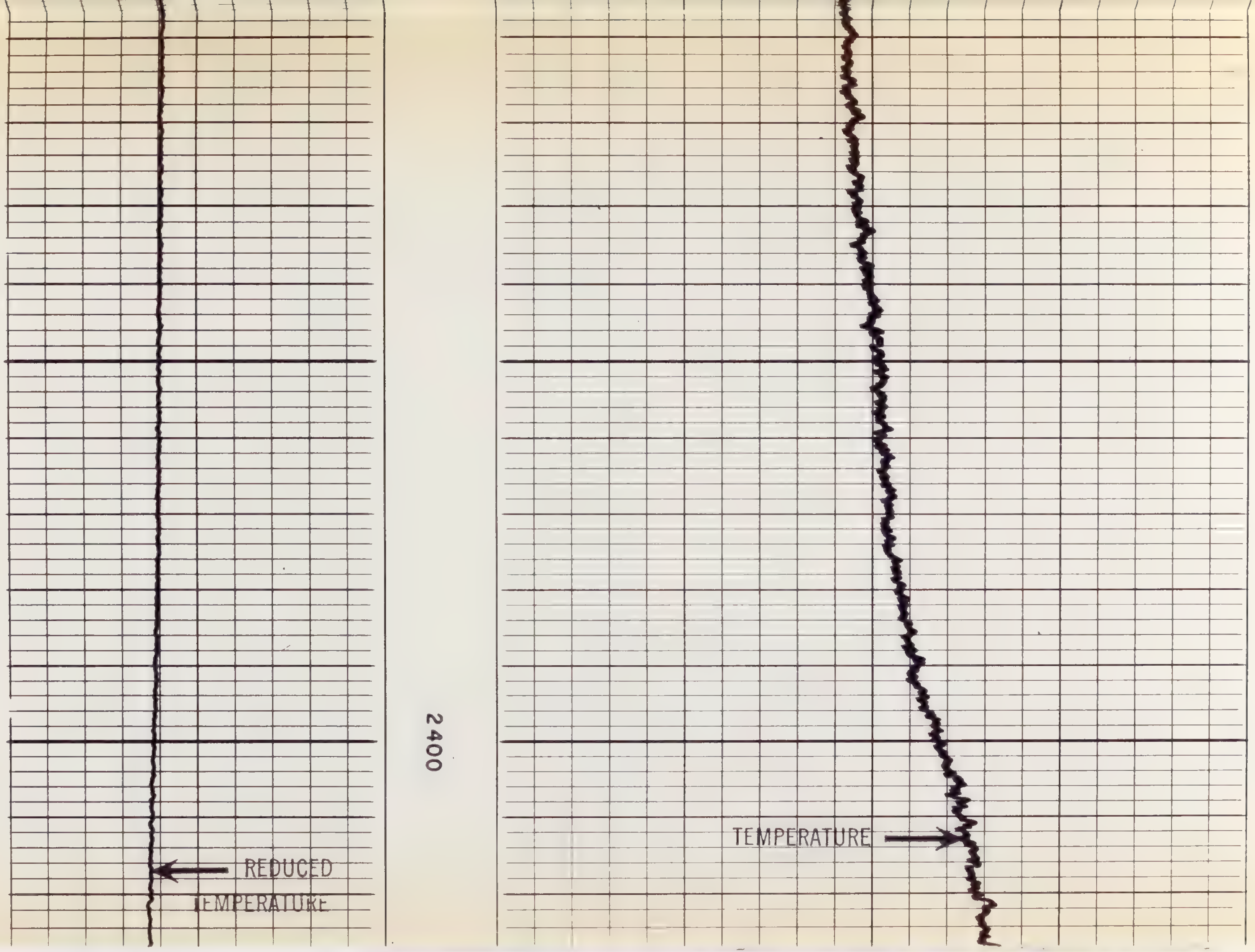
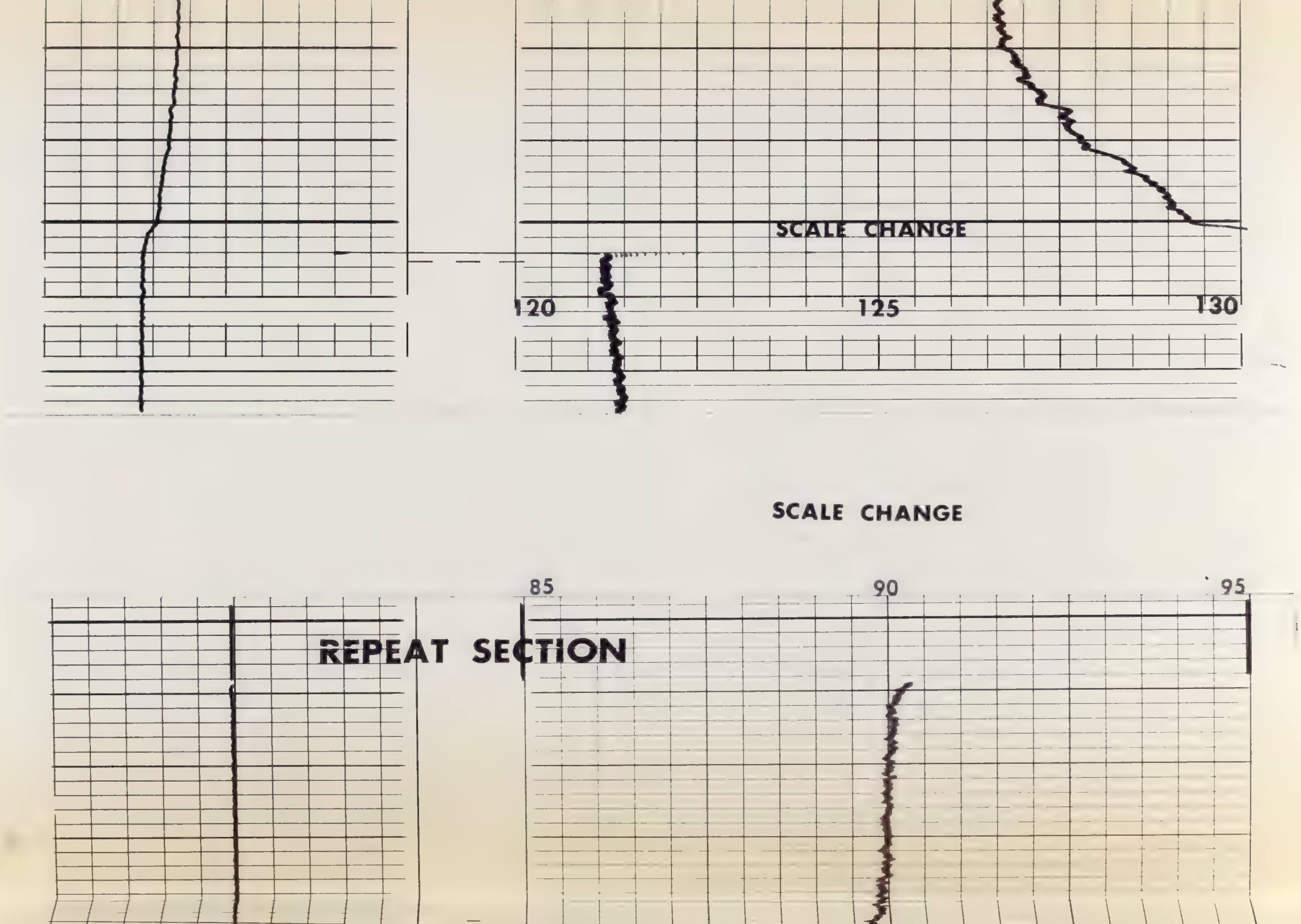
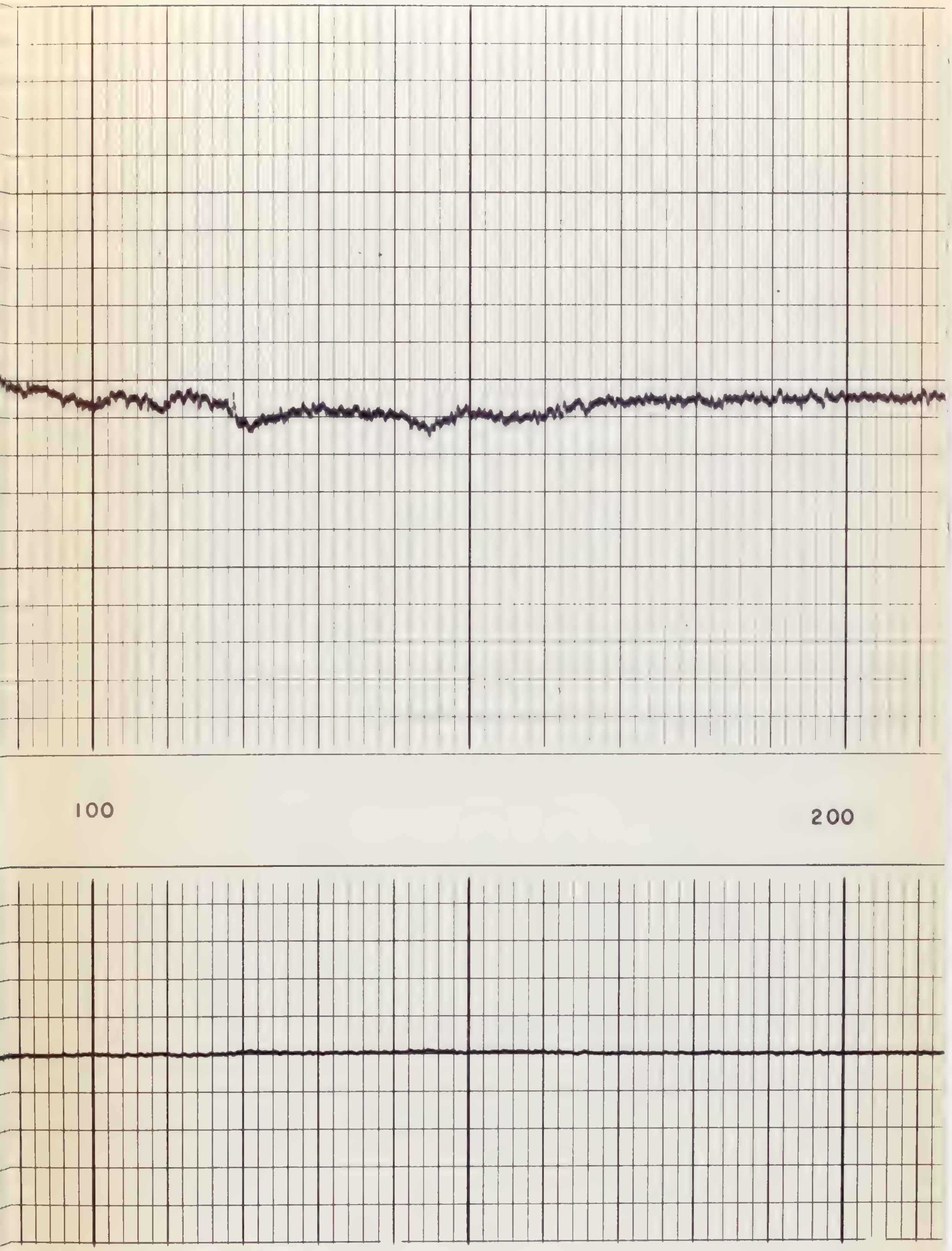

REDUCED TEMPERATURE
2400
TEMPERATURE


SCALE CHANGE
120
125
130
SCALE CHANGE
85
90
95
REPEAT SECTION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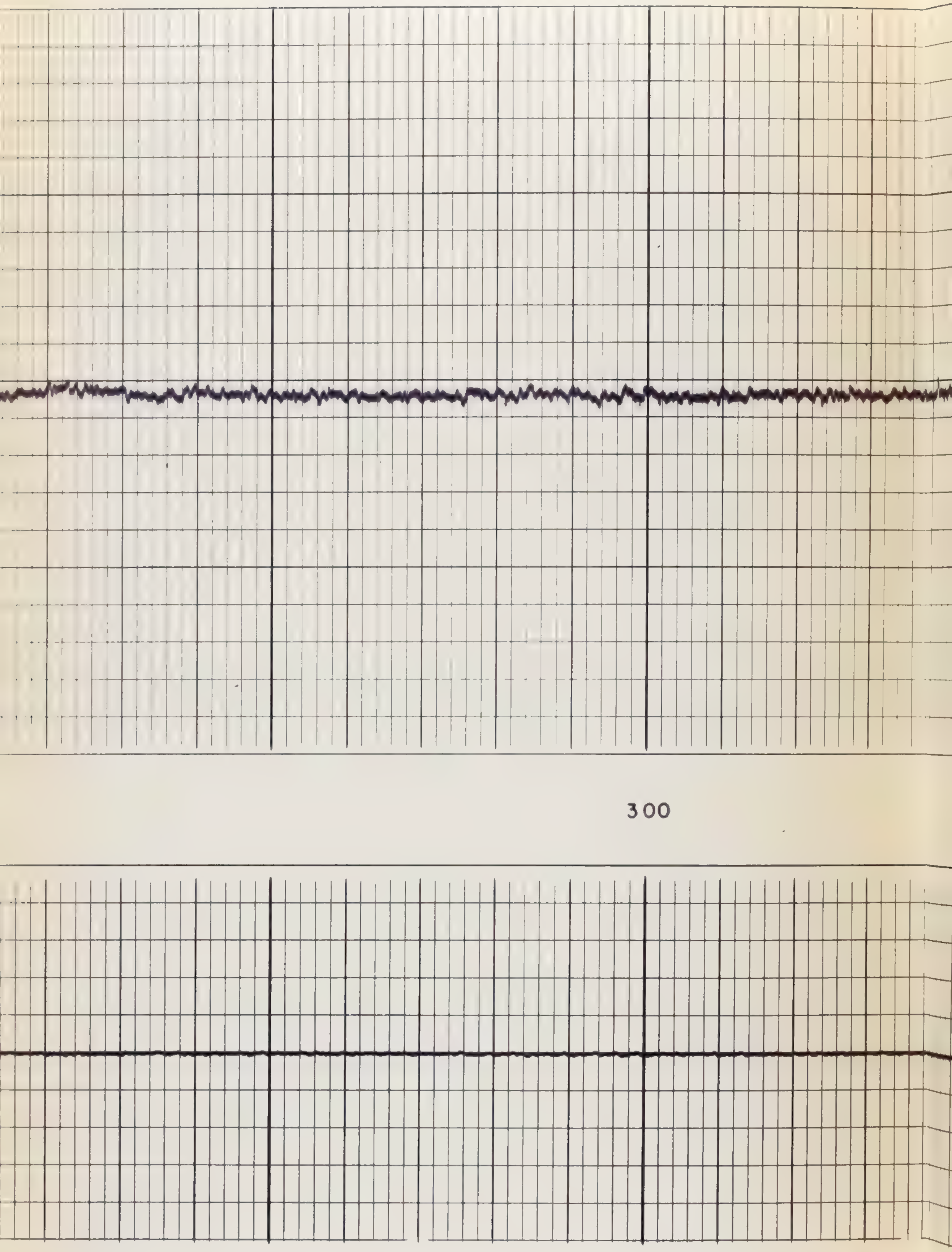
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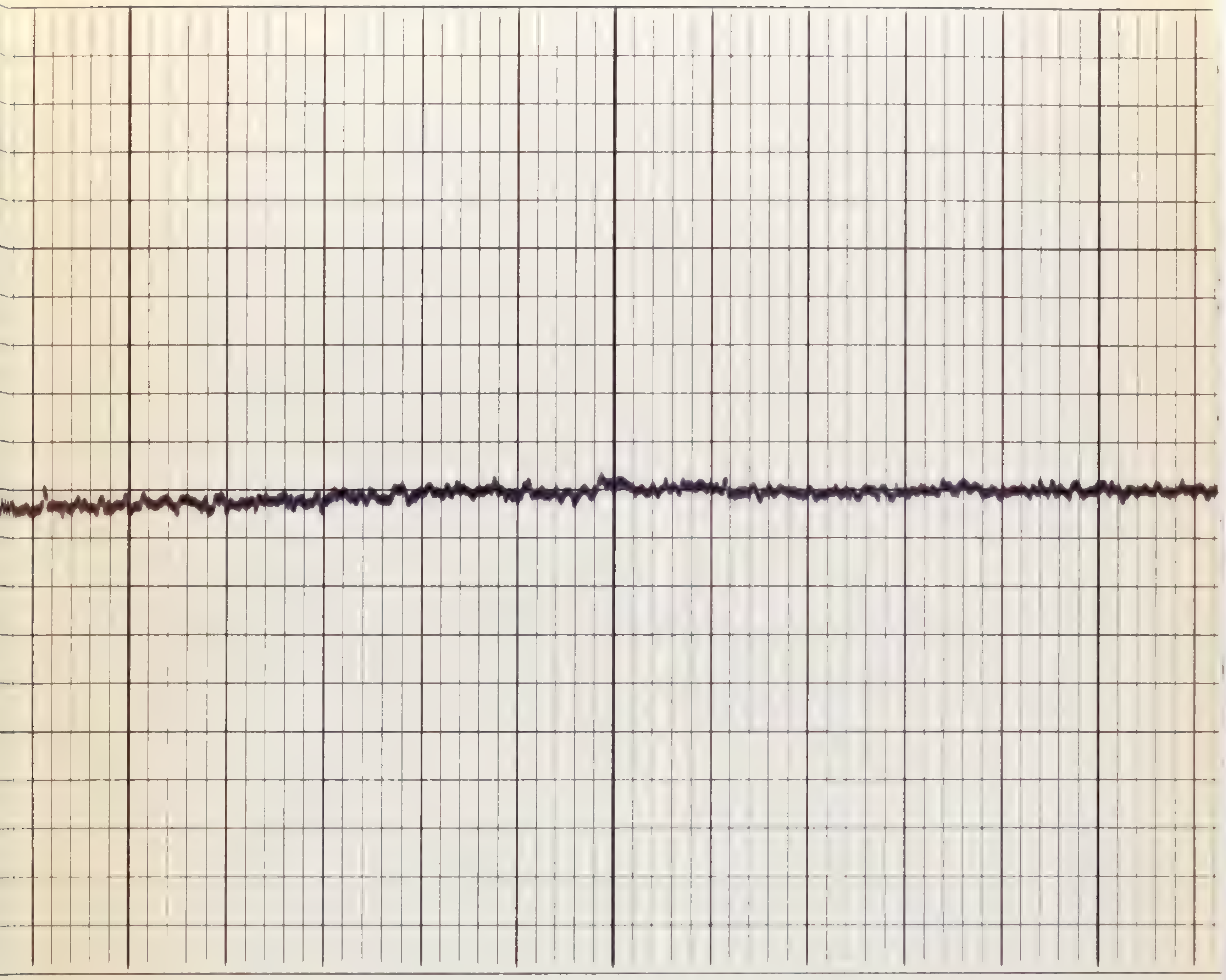

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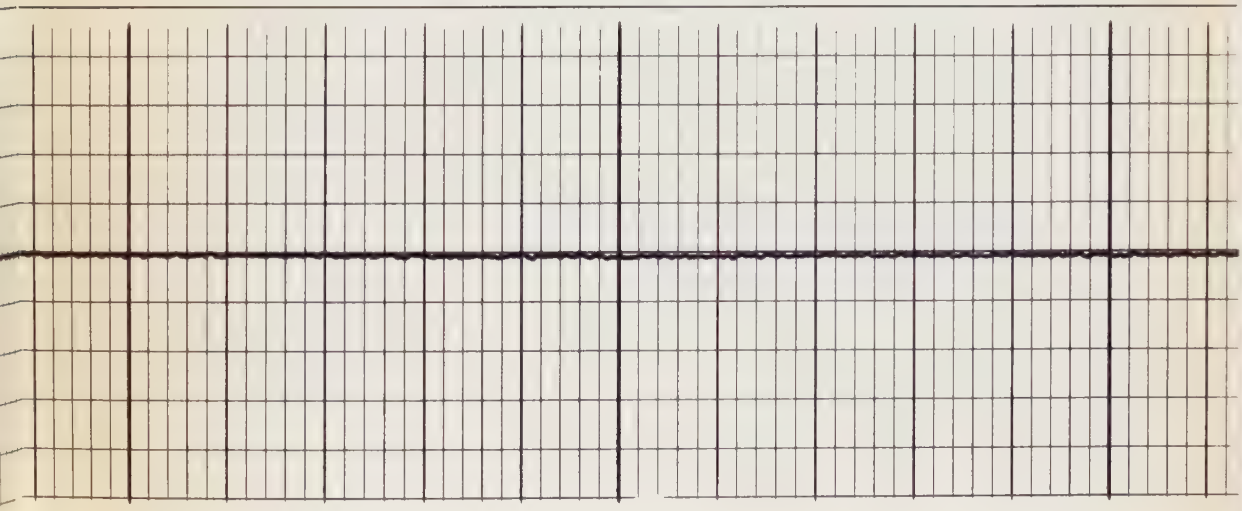

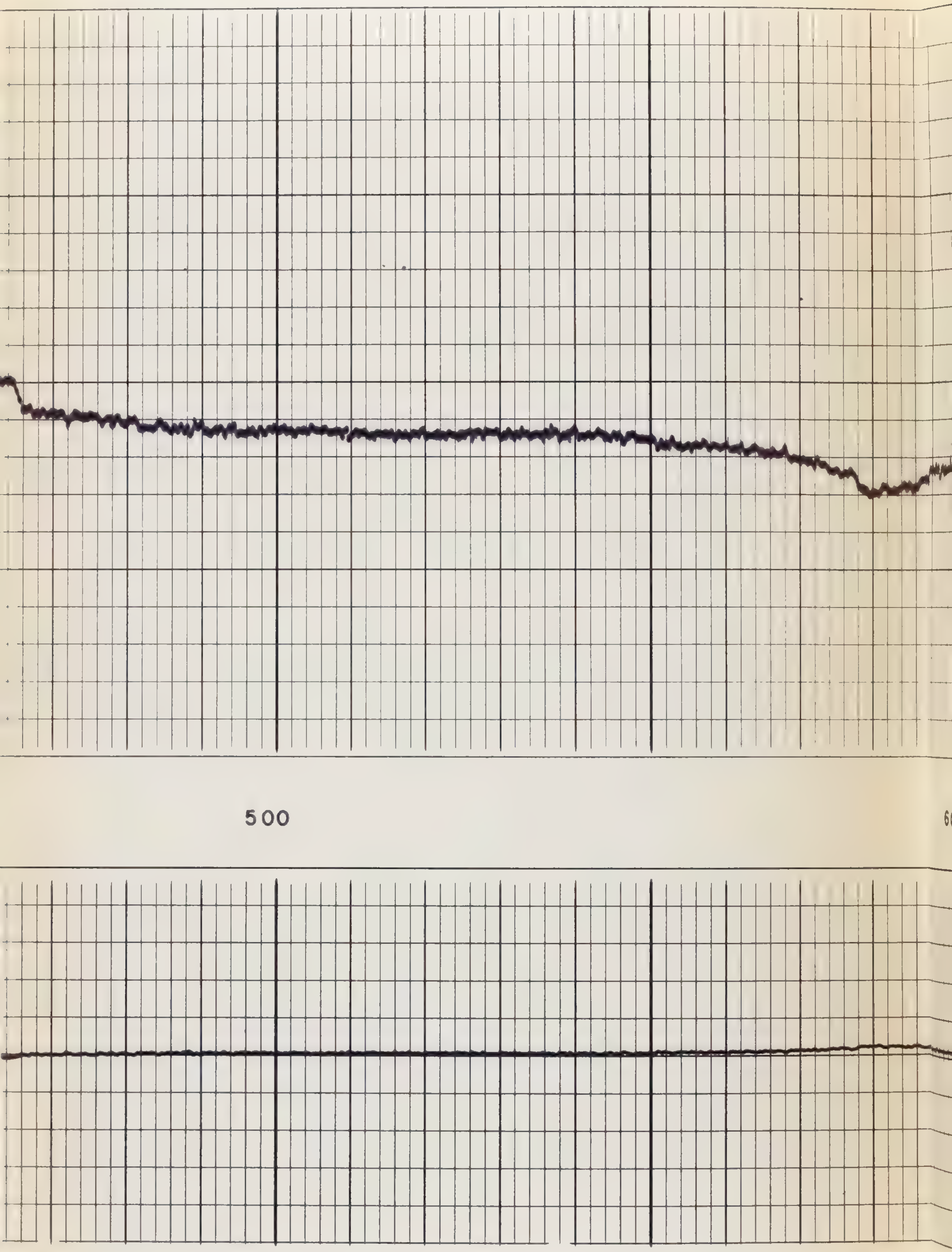
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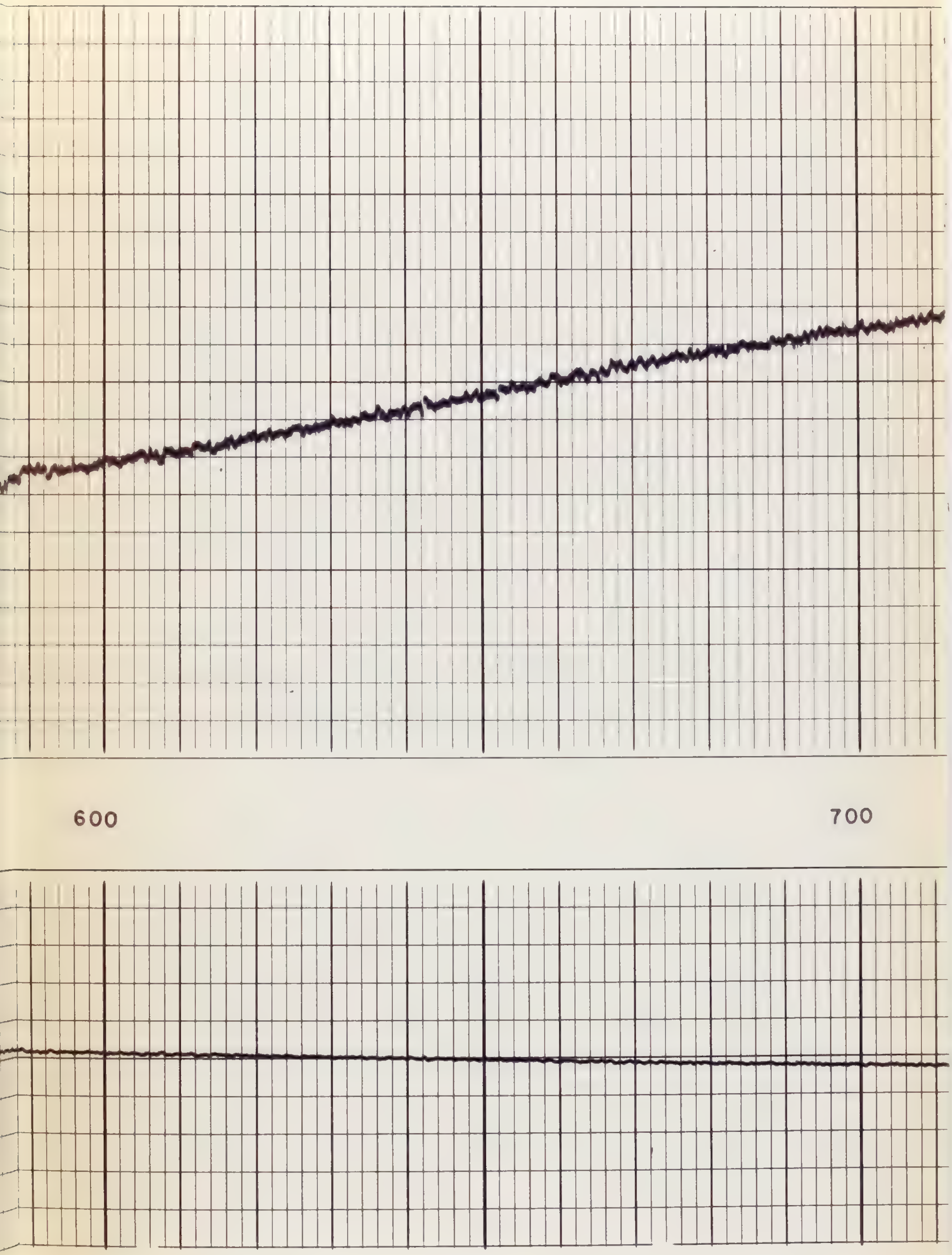
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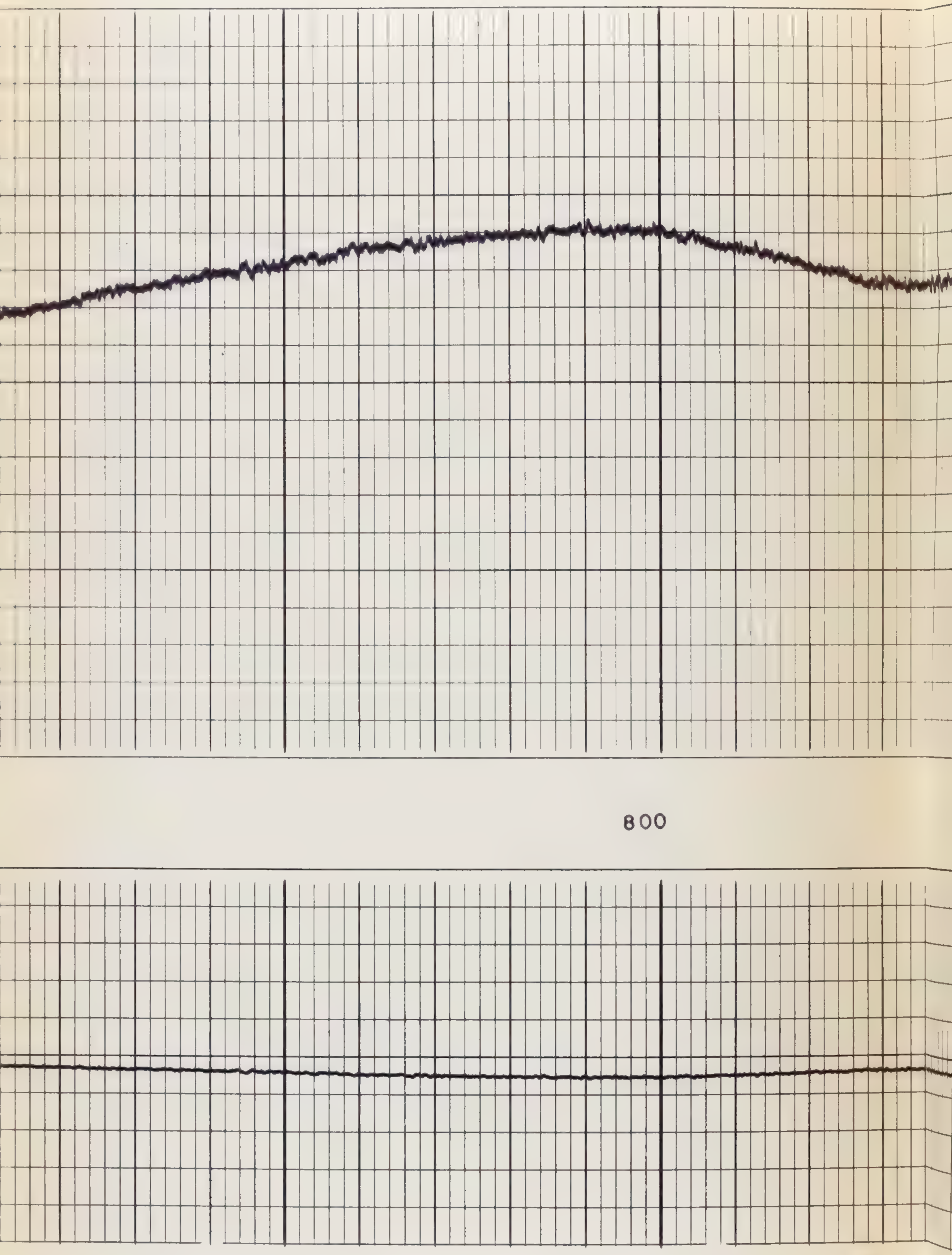
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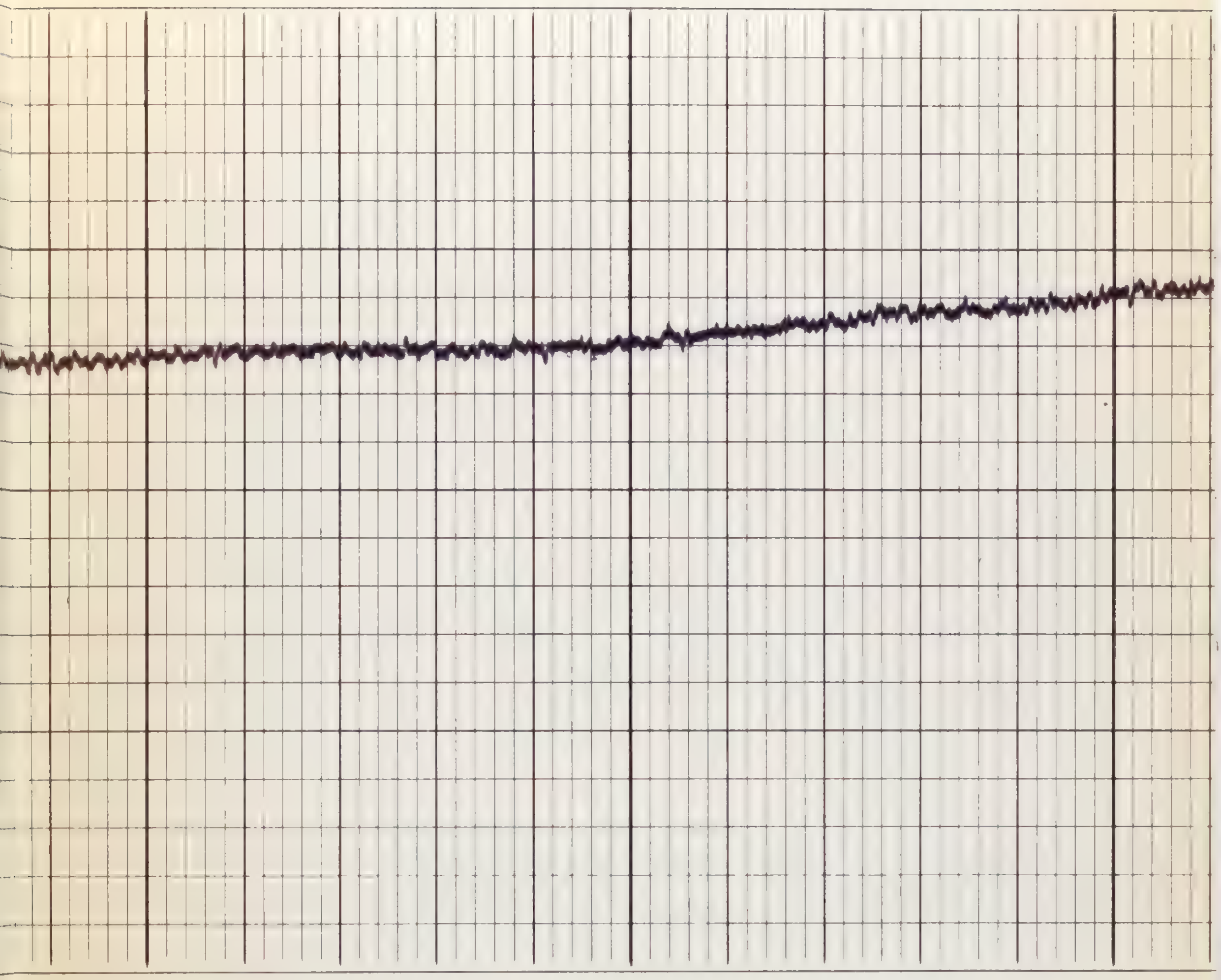

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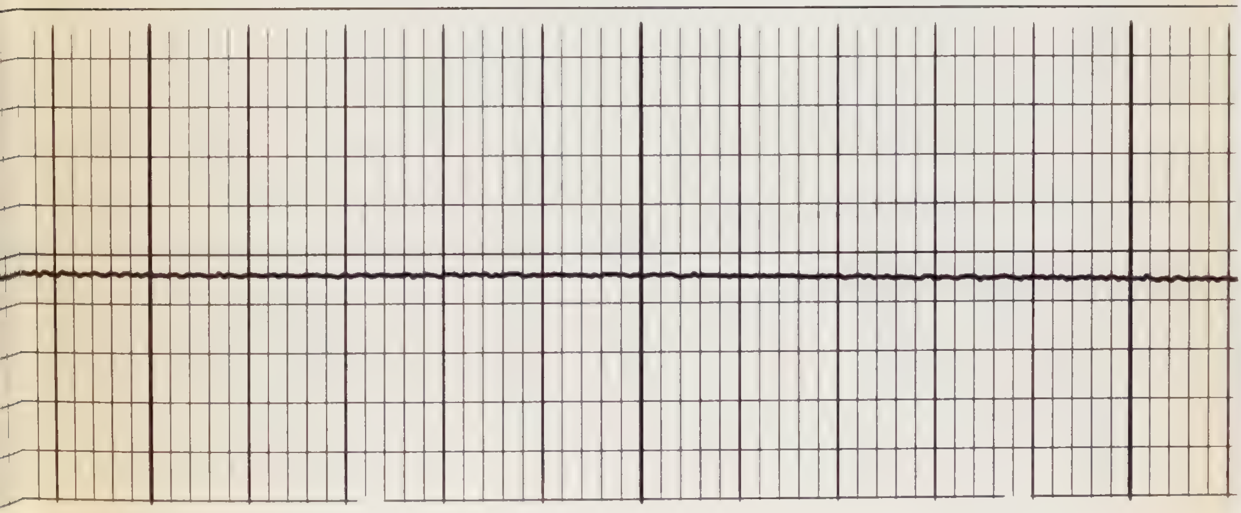

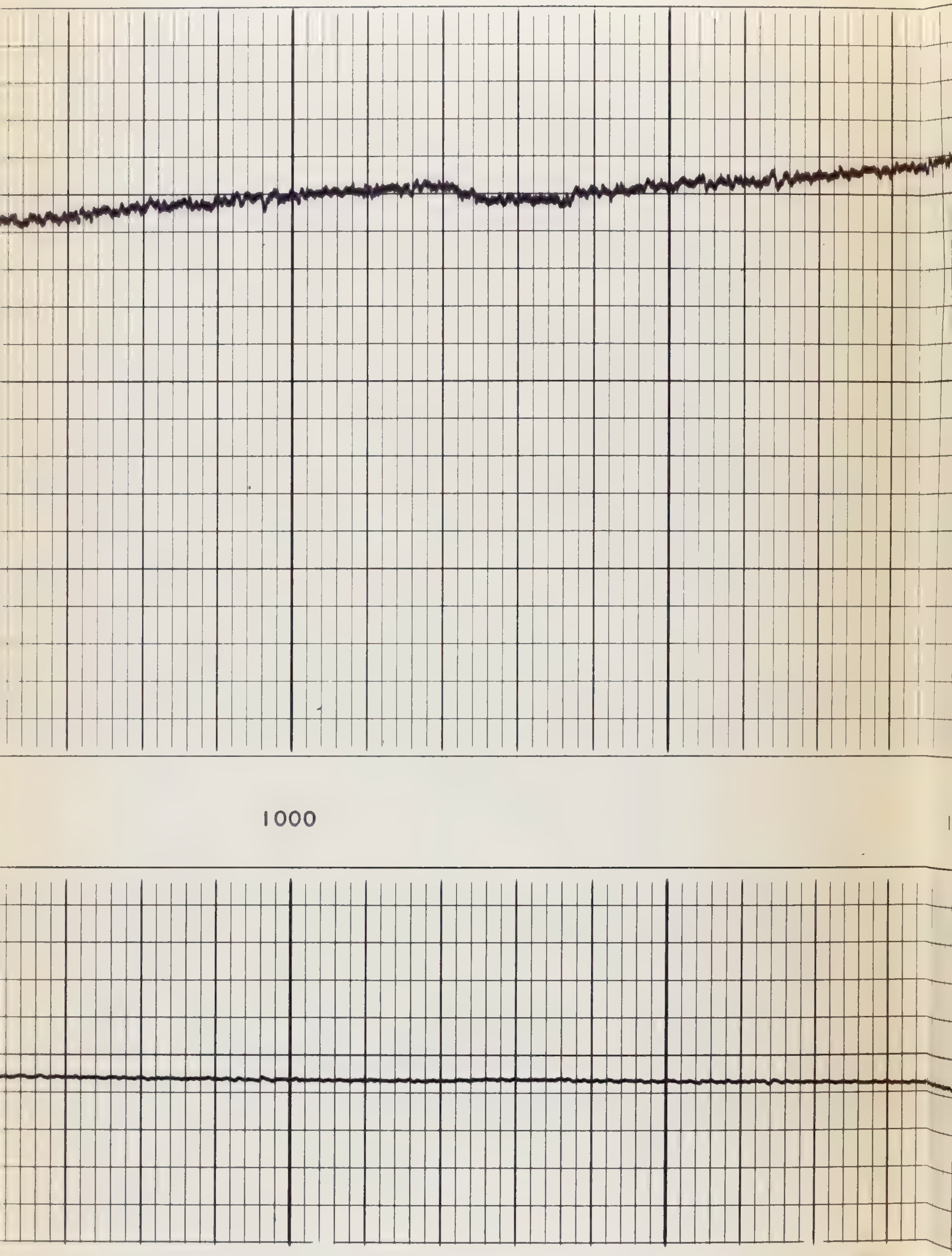
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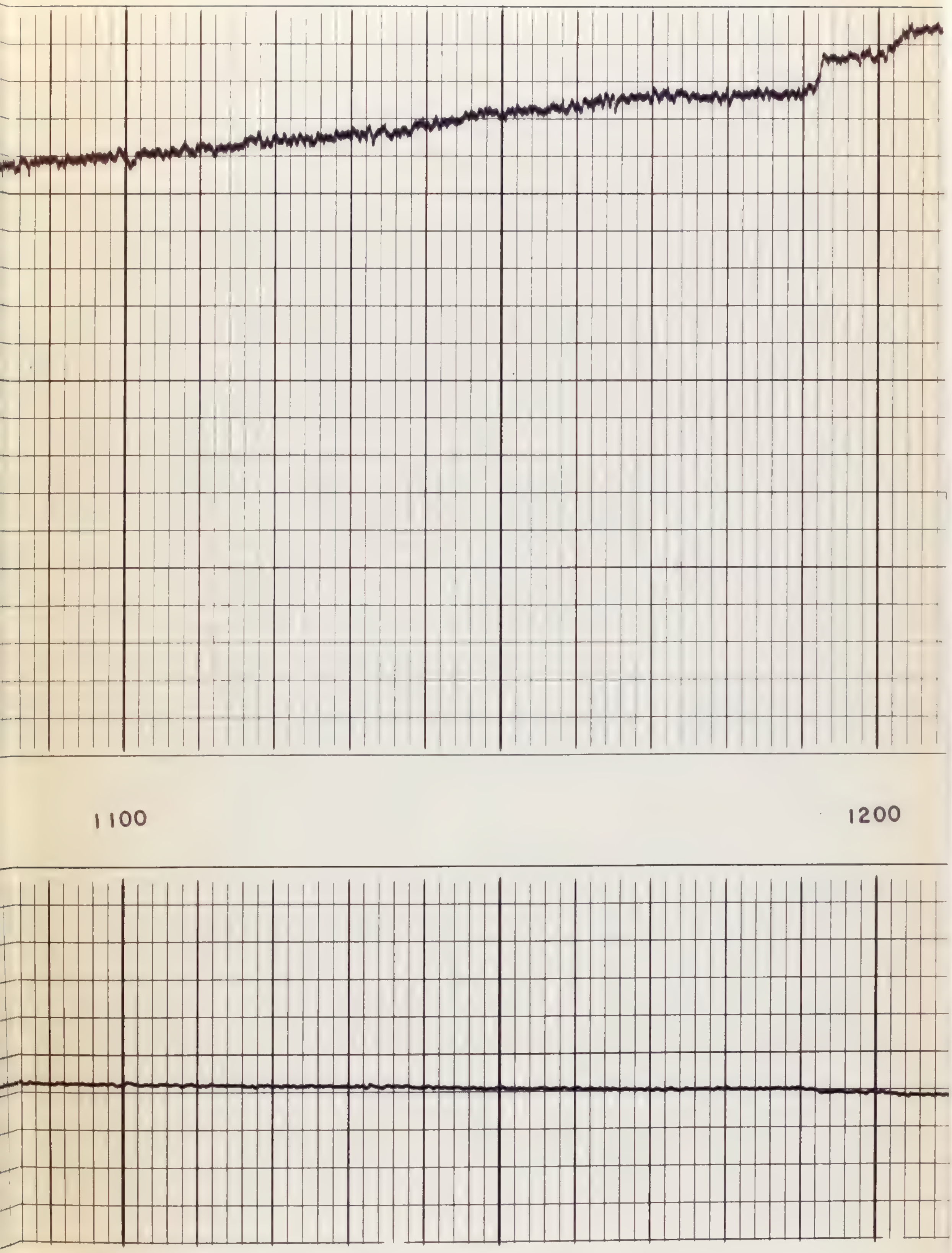
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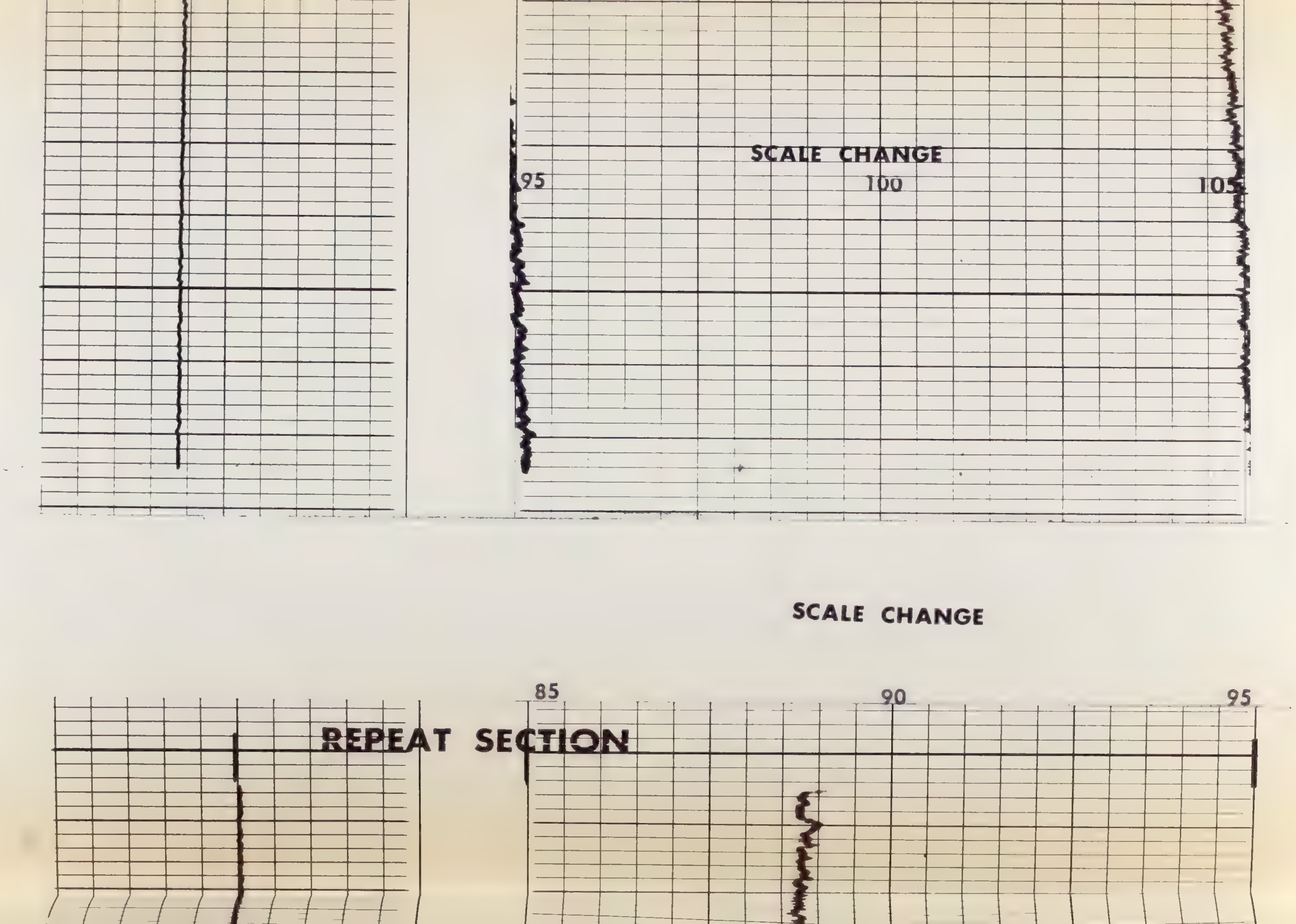
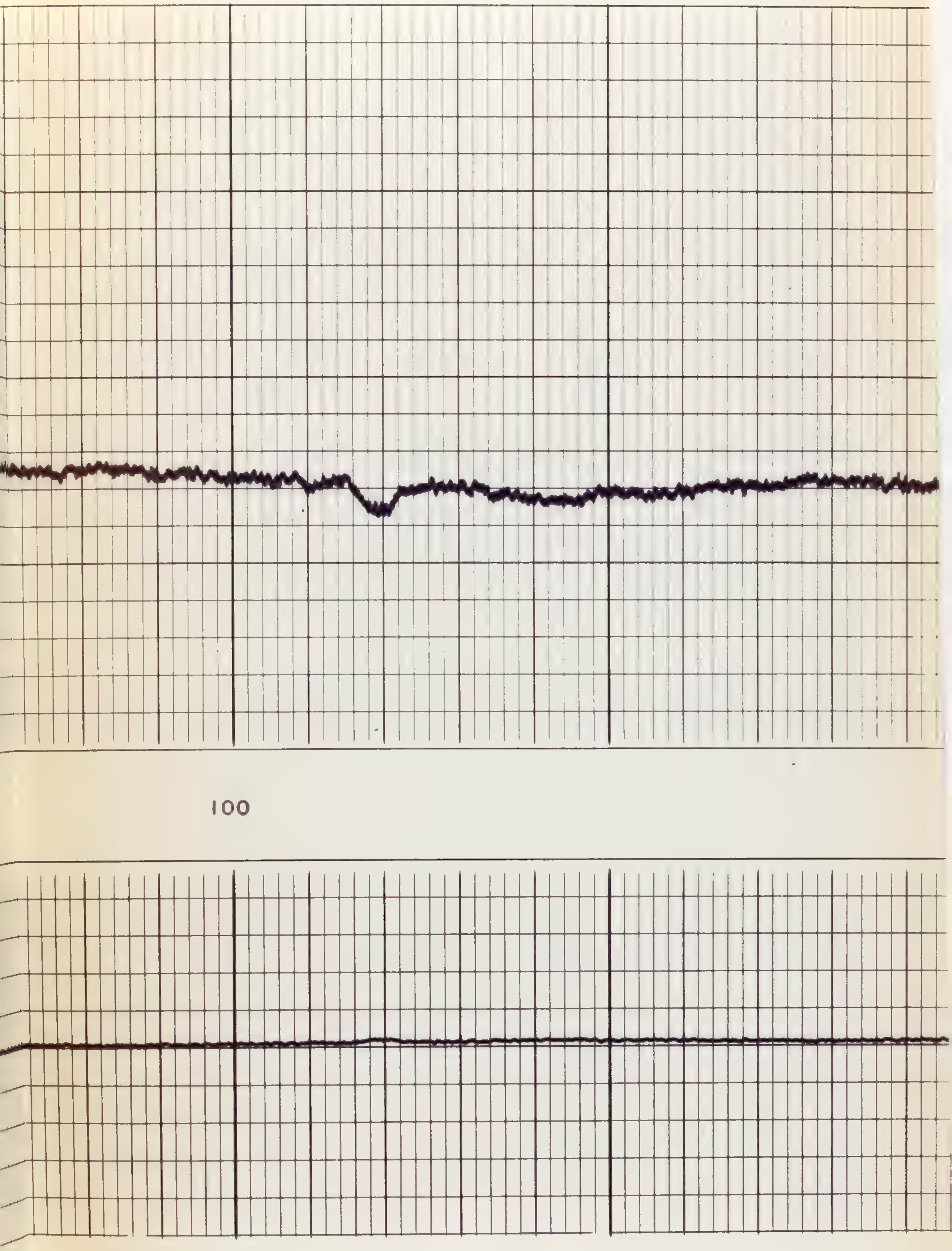

SCALE CHANGE
95
100
105
SCALE CHANGE
85
90
95
REPEAT SECTION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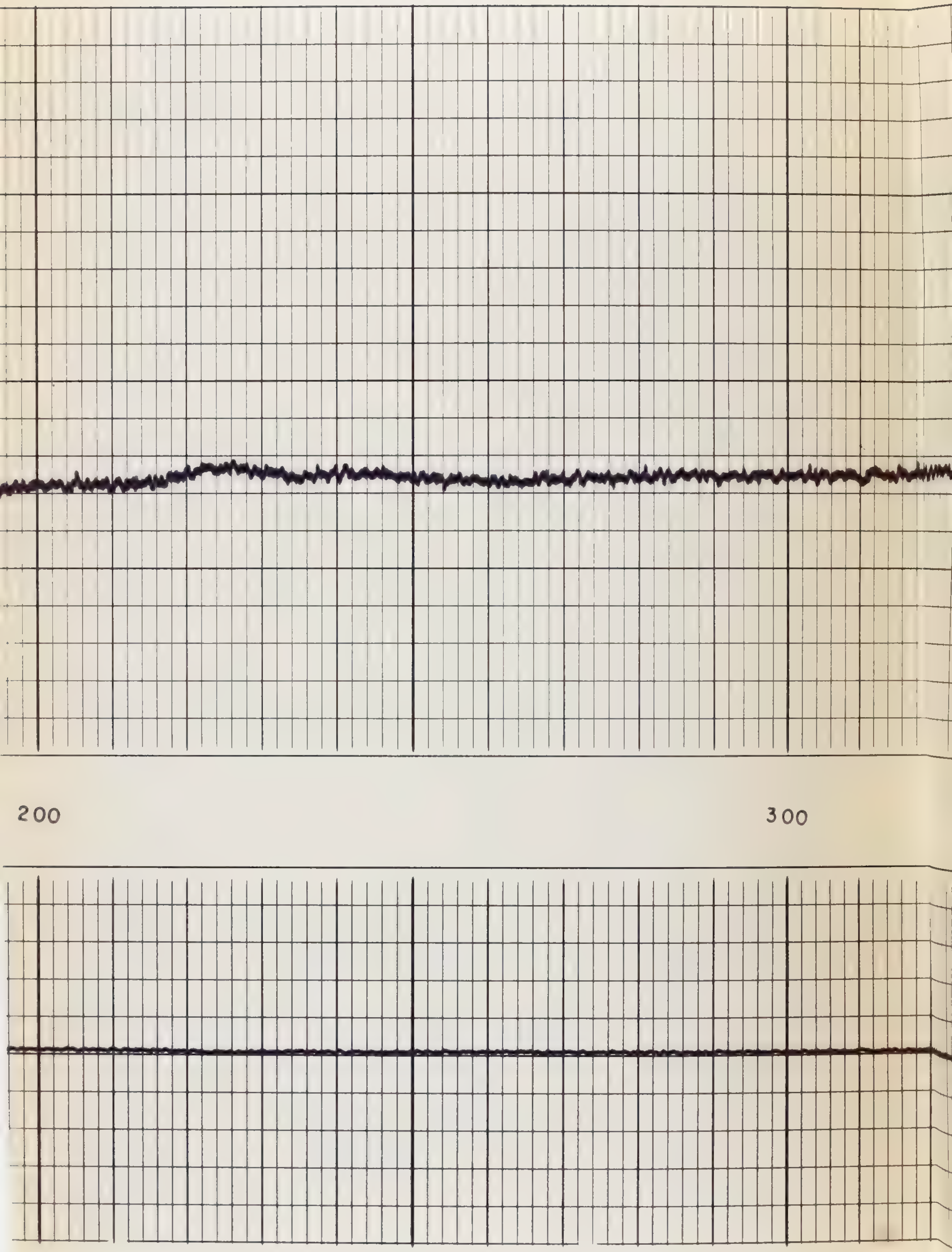
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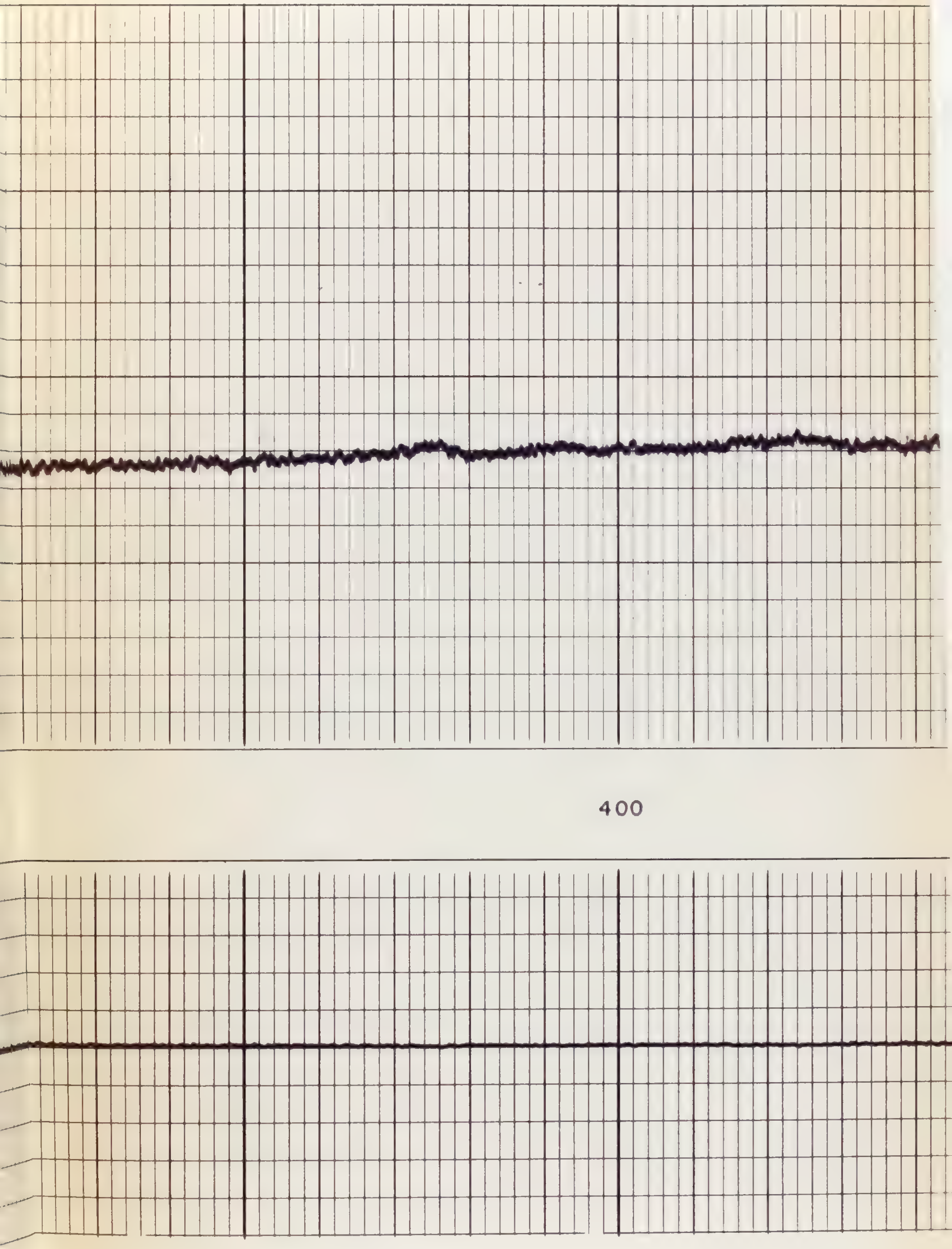
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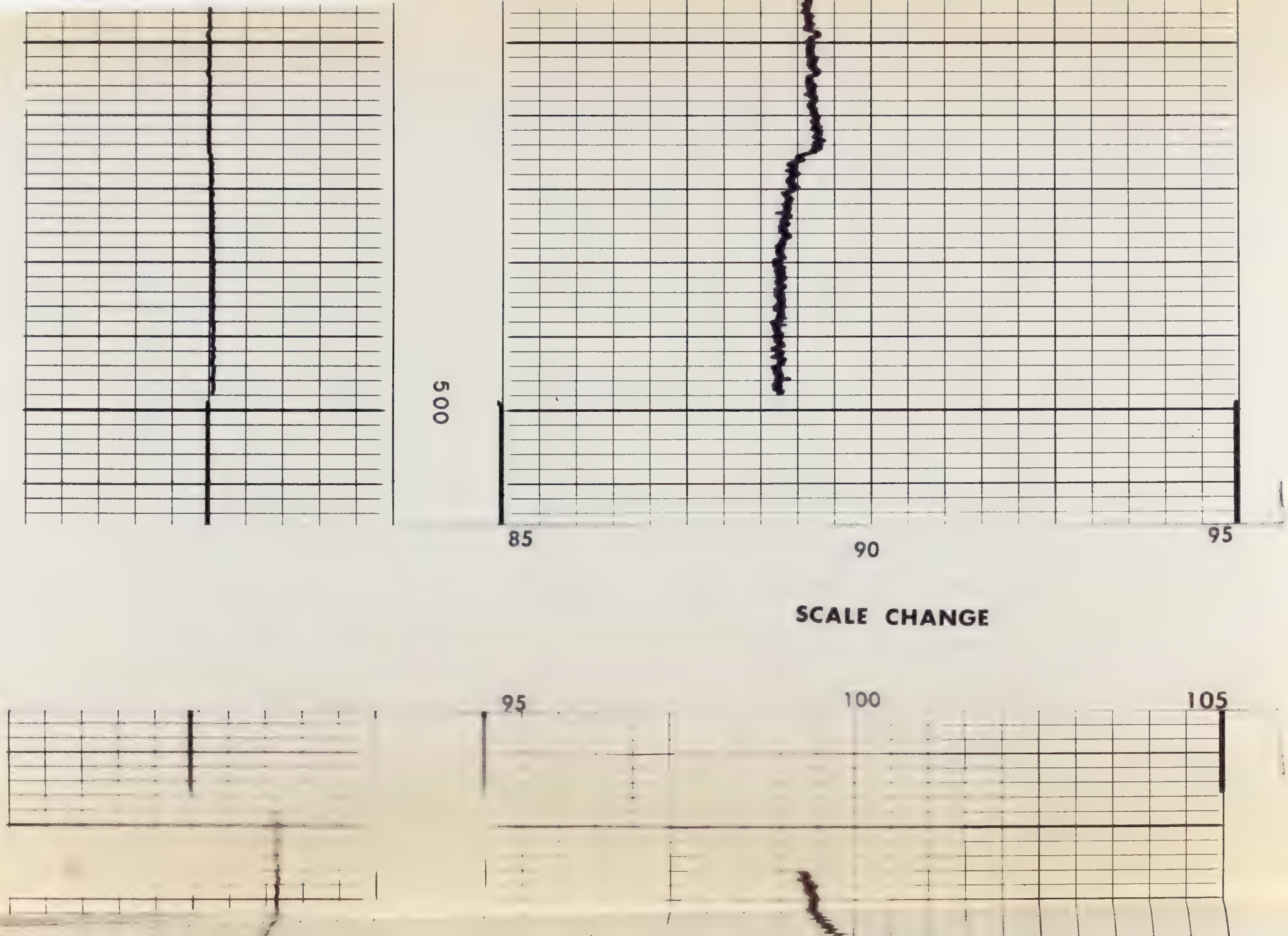
500
85
90
95
SCALE CHANGE
95
100
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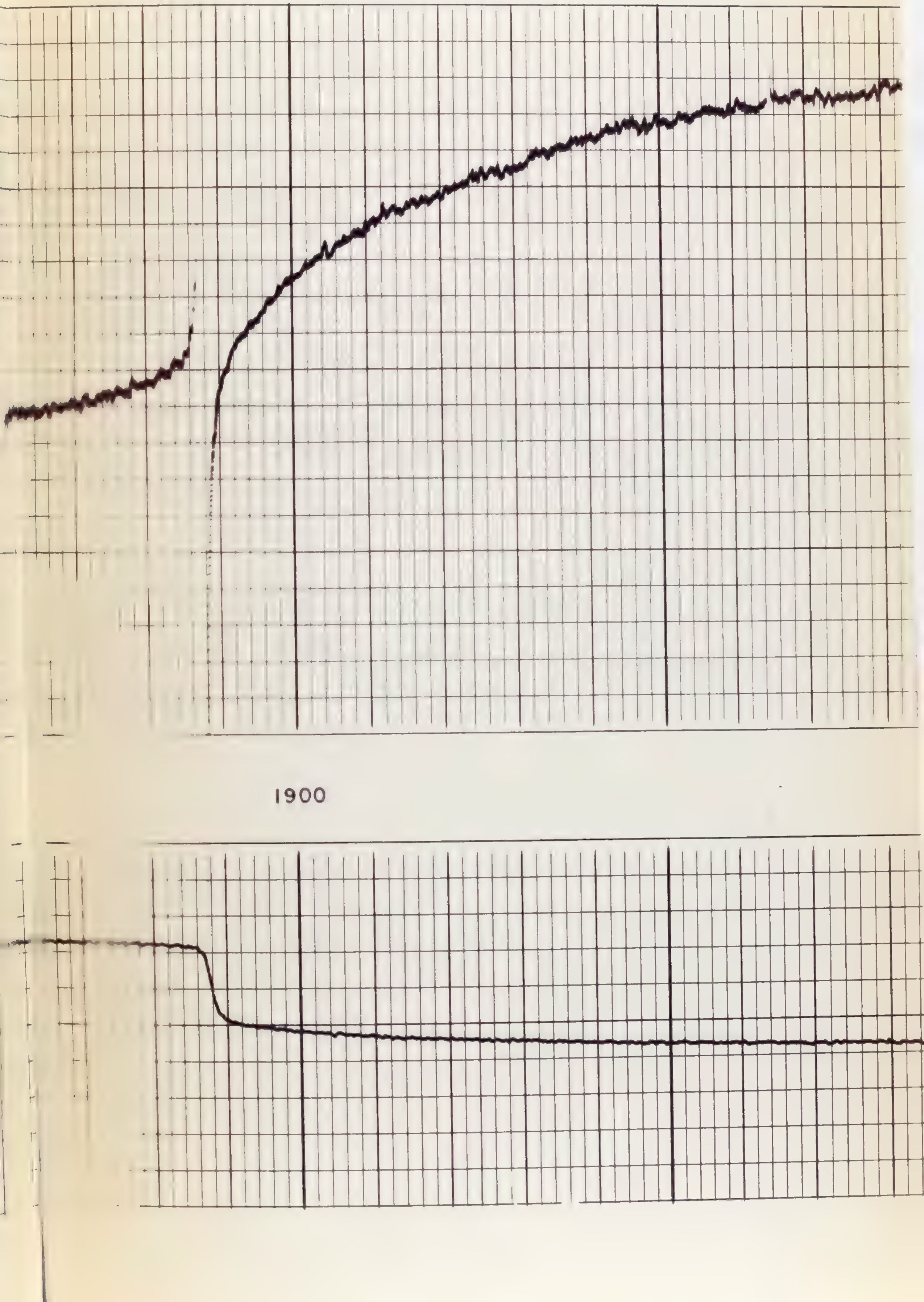
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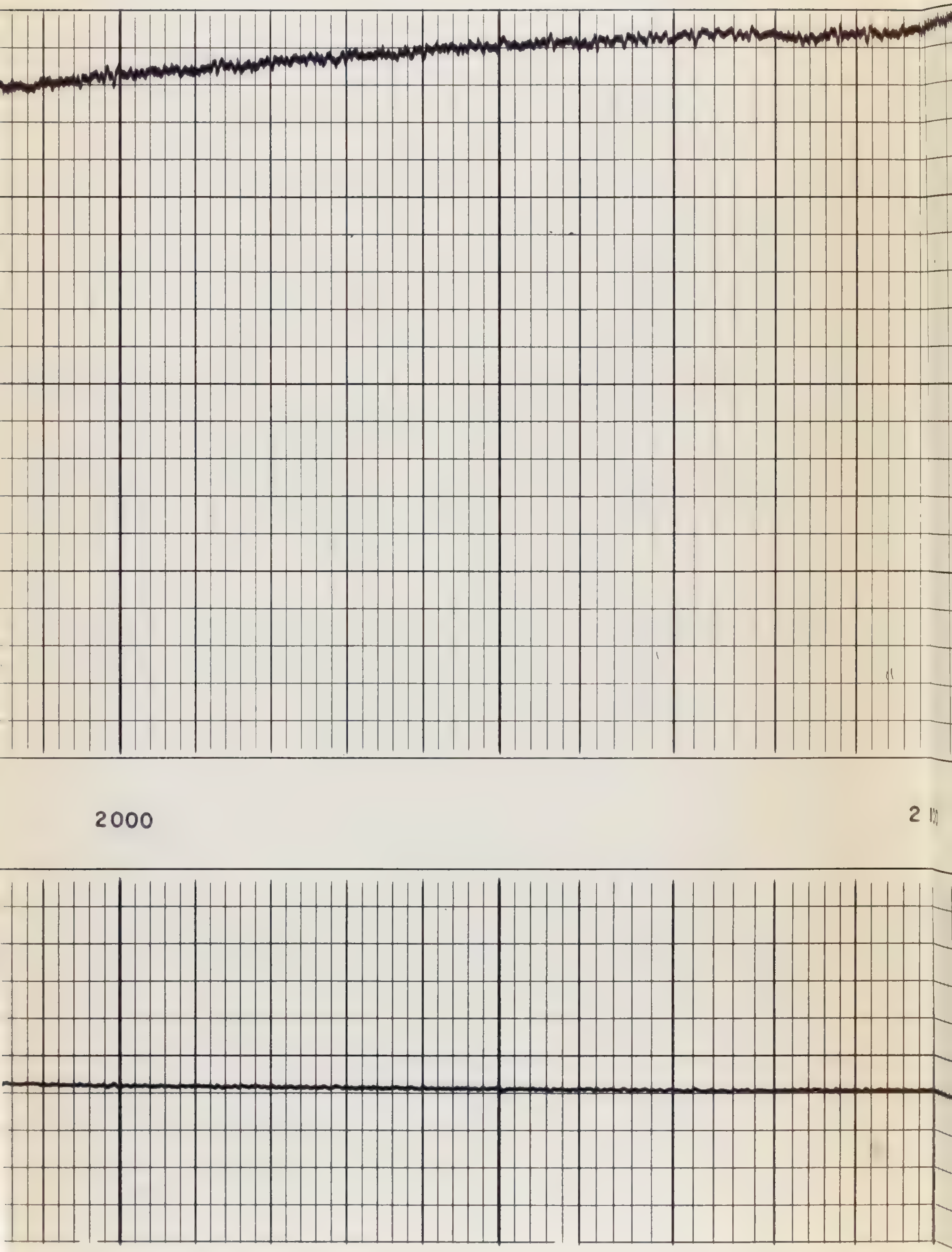
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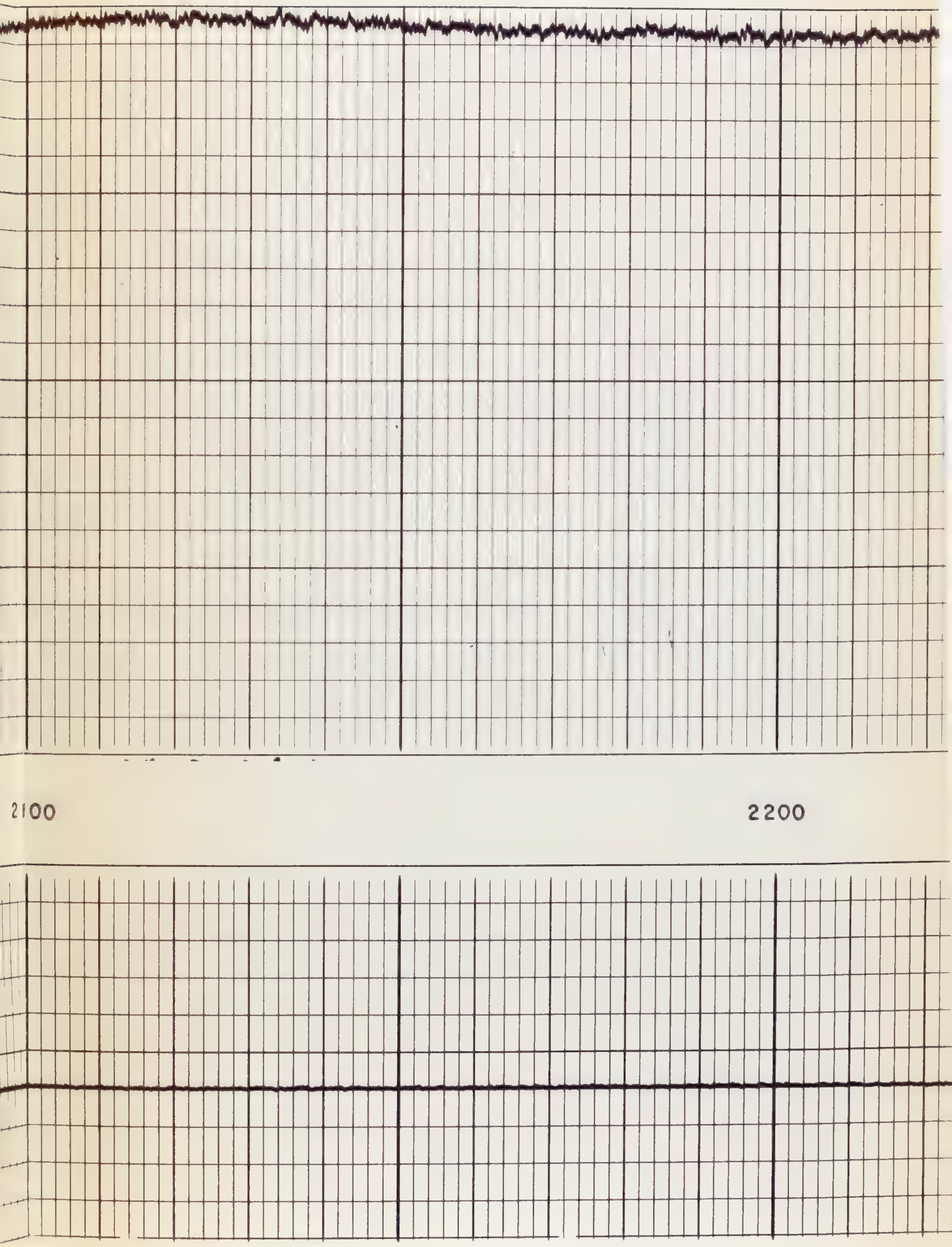
2100
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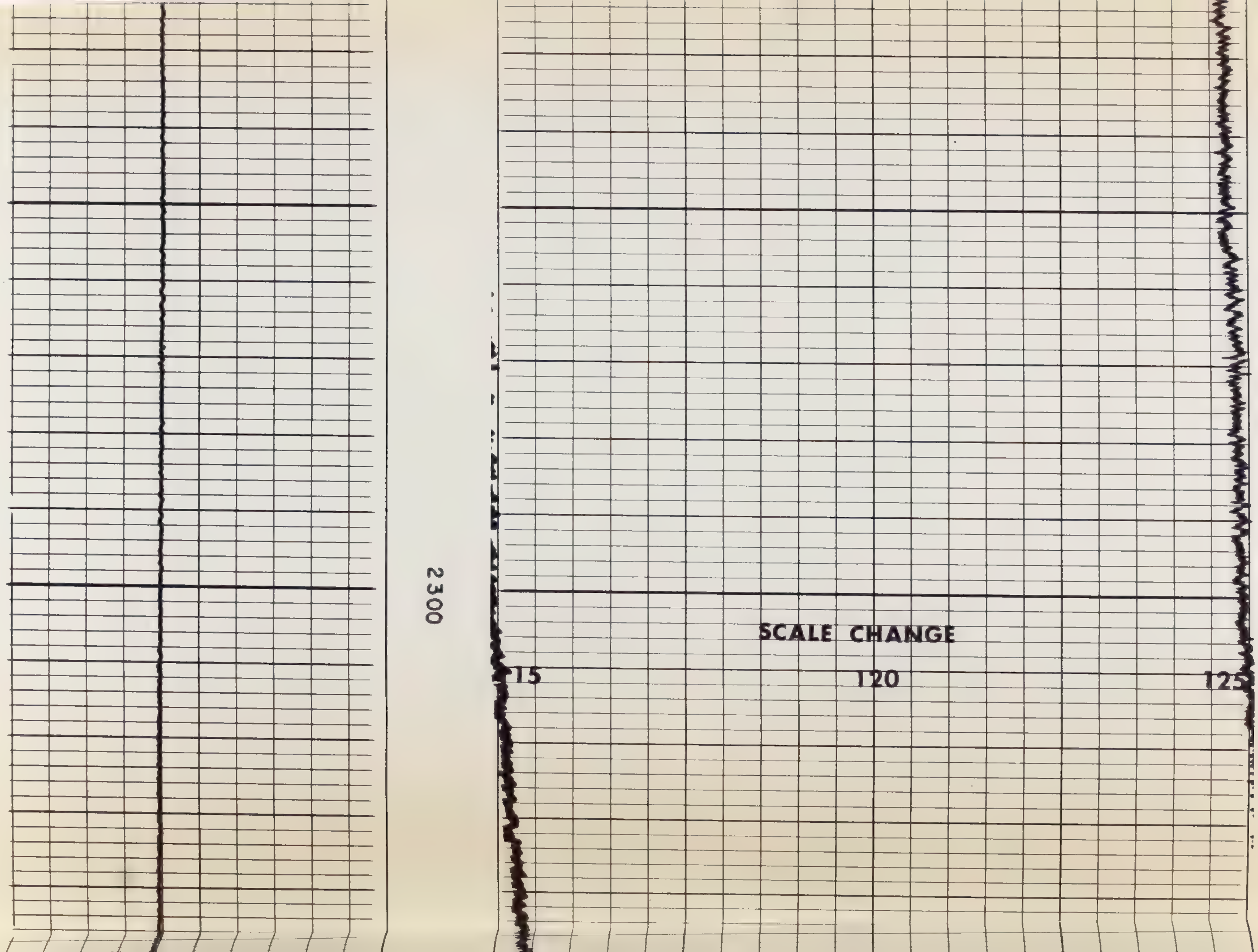
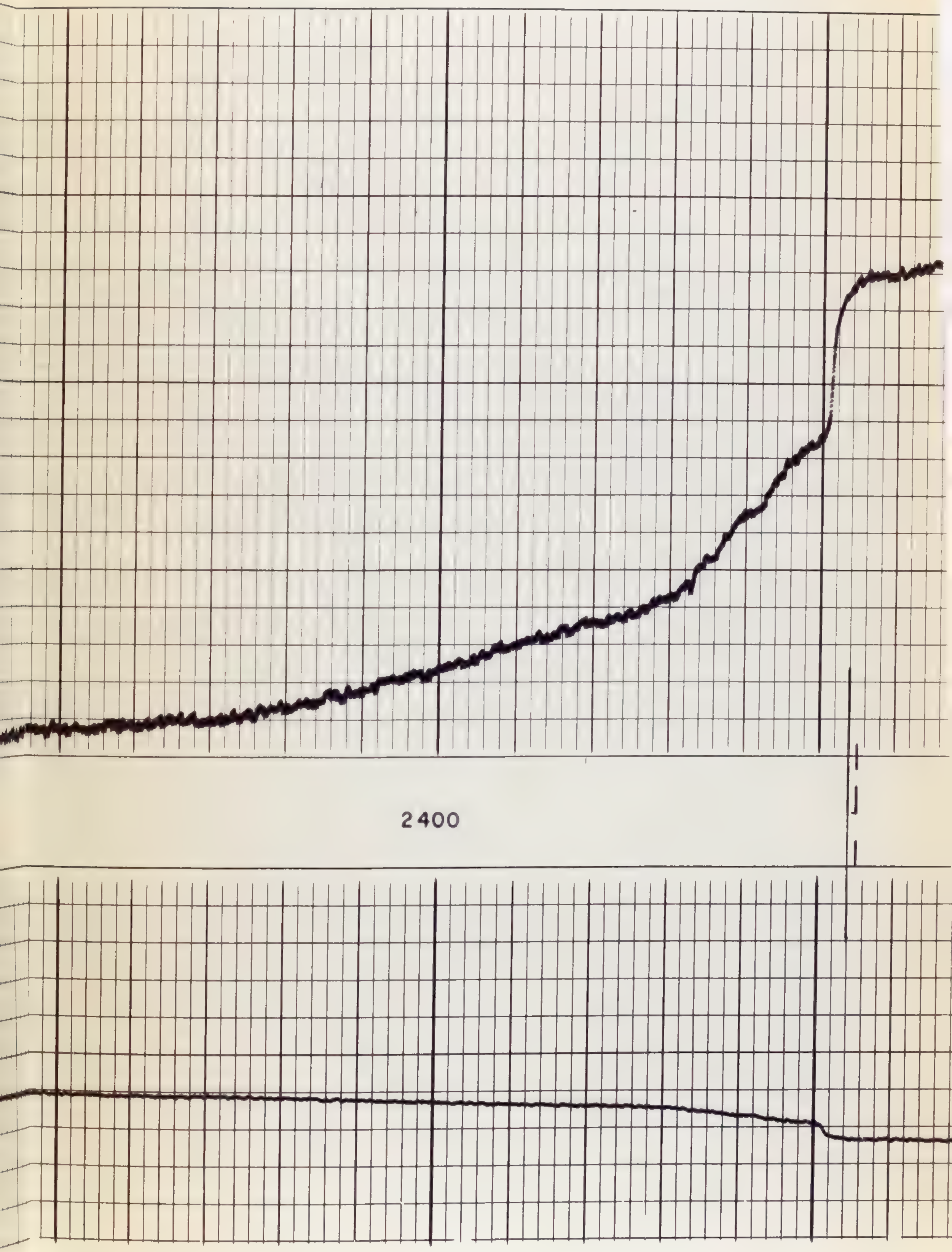
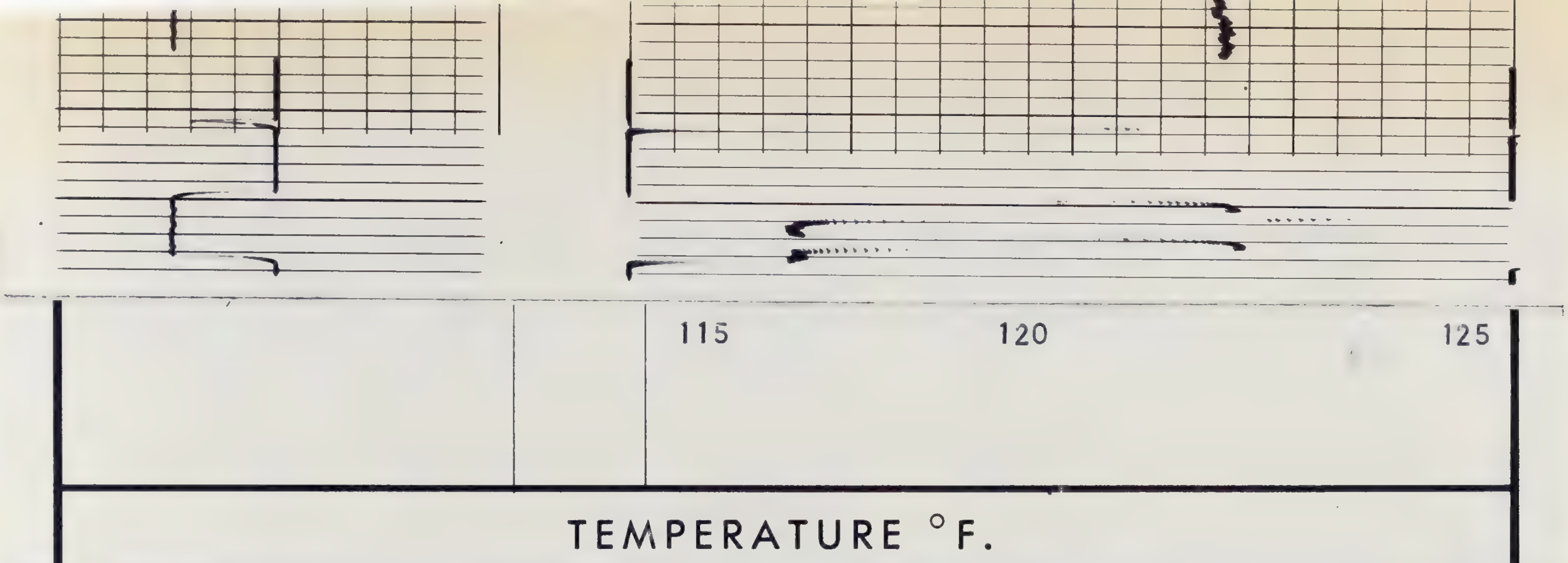

2300
SCALE CHANGE
15
120
125



2400



COMPANY ATLANTIC RICHFIELD
WELL SORGHUM GULCH NO. 17
FIELD SORGHUM GULCH
COUNTY RIO BLANCO
STATE COLORADO

SCHL. F. R. 2454
SCHL. T. D. 2455
DRLR. T. D. 2460

Schlumberger

BOREHOLE COMPENSATE
SONIC LOG - GAMMA RA

(WITH CALIPER)

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL SORGHUM GULCH #20
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 20

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.
261' FSL & 1599' FEL
Sec. 31 Twp. 2S Rge. 96W

Other Services:
FDC-GR
TEMP.

Permanent Datum: GL ; Elev.: 6358
Log Measured From KB , 0 Ft. Above Perm. Datum
Drilling Measured From KB

Elev.: K.B.
D.F.
G.L. 635

Date	12-12-74			
Run No.	ONE			
Depth—Driller	986.5			
Depth—Logger	987			
Btm. Log Interval	979			
Top Log Interval	SURFACE			
Casing—Driller	7 @ 216	@	@	@
Casing—Logger	216			
Bit Size	7			
Type Fluid in Hole	WATER			
Fluid Level				
Dens. | Visc.				
pH | Fluid Loss	ml	ml	ml	
Source of Sample	PIT			
R_m @ Meas. Temp.	5.54 @ 45 °F	@ °F	@ °F	@
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: R_{mf} | R_{mc}				
R_m @ BHT	3.72 @ 67 °F	@ °F	@ °F	@
Time Since Circ.	39 HOURS			
Max. Rec. Temp.	67 °F	°F	°F	
Equip. | Location	7699 | GJ			
Recorded By	MOSS-BARGHOUTI			
Witnessed By	BURNS			

SWS-1383-H

FOLD HERE

The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date / Sample No.				
Depth - Driller				
Type Fluid in Hole				
Dens. / Visc.				
ph / Fluid Loss		ml		ml
Source of Sample				
R_m @ Meas. Temp.	@	°F	@	°F
R_{mf} @ Meas. Temp.	@	°F	@	°F
R_{mc} @ Meas. Temp.	@	°F	@	°F
Source: R_{mf} / R_{mc}				
R_m @ BHT	@	°F	@	°F
R_{mf} @ BHT	@	°F	@	°F
R_{mc} @ BHT	@	°F	@	°F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Sonic Panel No.	439			
Sonic Cart No.	166			
Sonic Sonde No.	149			
Mem. Panel No.				
G.R. Cart. No.				
G.R. Panel No.				
Caliper No				
TTR No.				
Cent. Device				
Stand off - Inches				
Time Const. - Sec.				
Speed - F.P.M.				

REMARKS

Service Order No. - 94822

CIRCULATION STOPPED 12-11-74 @ 0245 FOR
REAMING & DST'S

CENTRALIZERS USED:
1/VCD @ BOTTOM OF SLS
2/SPRING TYPE @ BOTTOM OF SLC
SCOPE: 670
VCD: 851

CALIBRATION DATA

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.	RECORDING SPEED (FT./MIN.)
GAMMA RAY:	196	600	10			2	60

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

GAMMA RAY
API UNITS

0 150

150 300

CALIPER
HOLE DIAM. IN INCHES

5 15

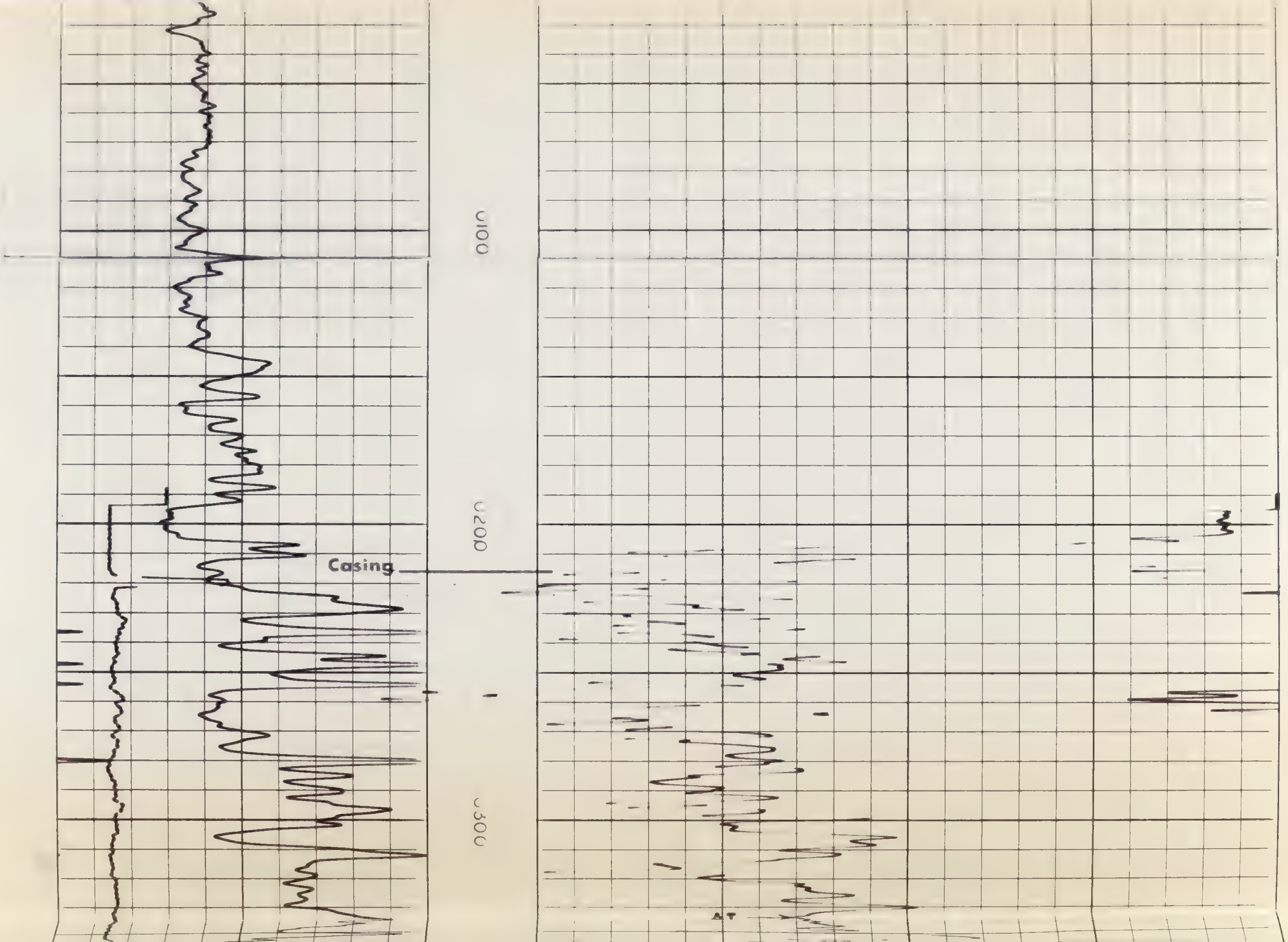
DEPTHS

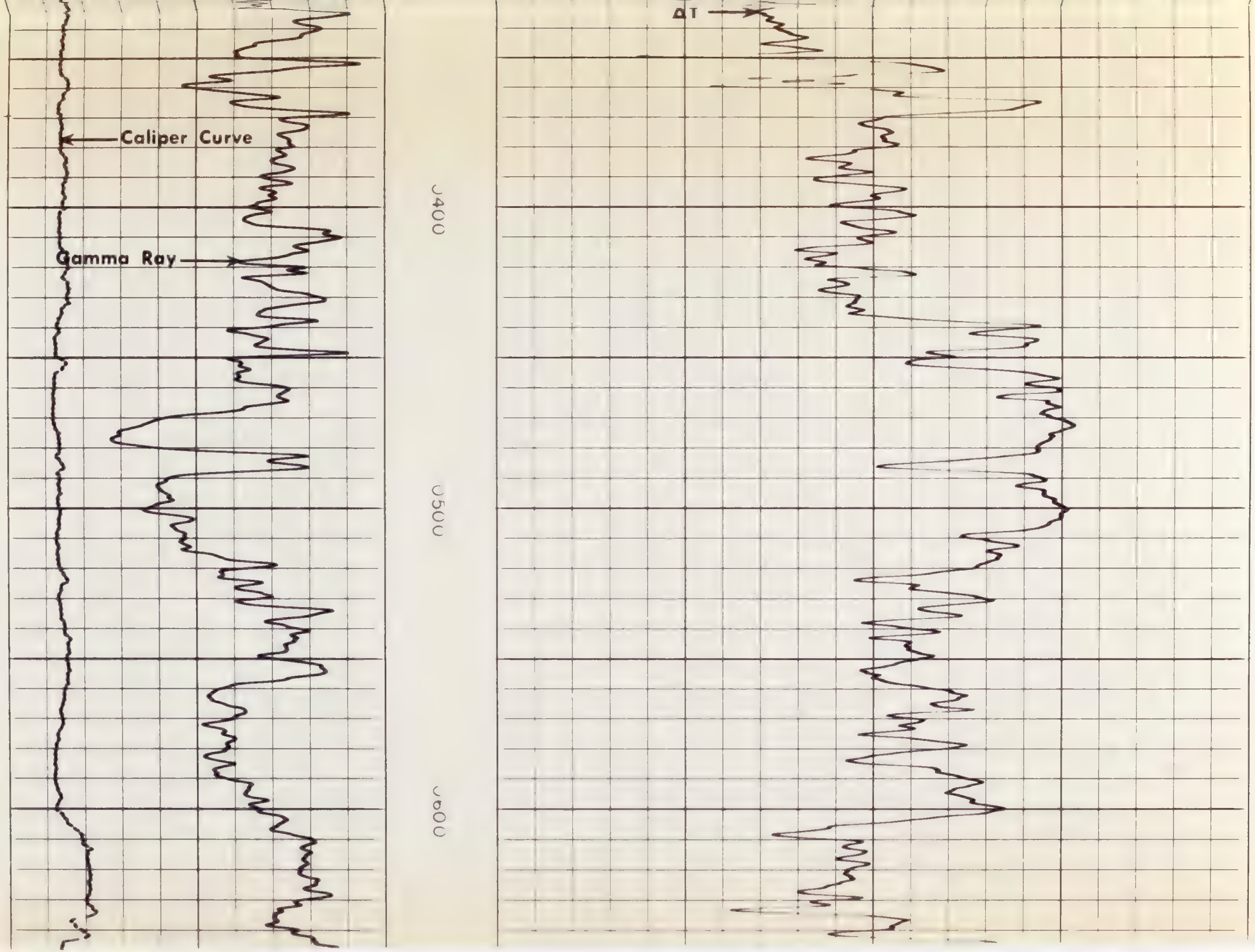
INTERVAL TRANSIT TIME
MICROSECONDS PER FOOT

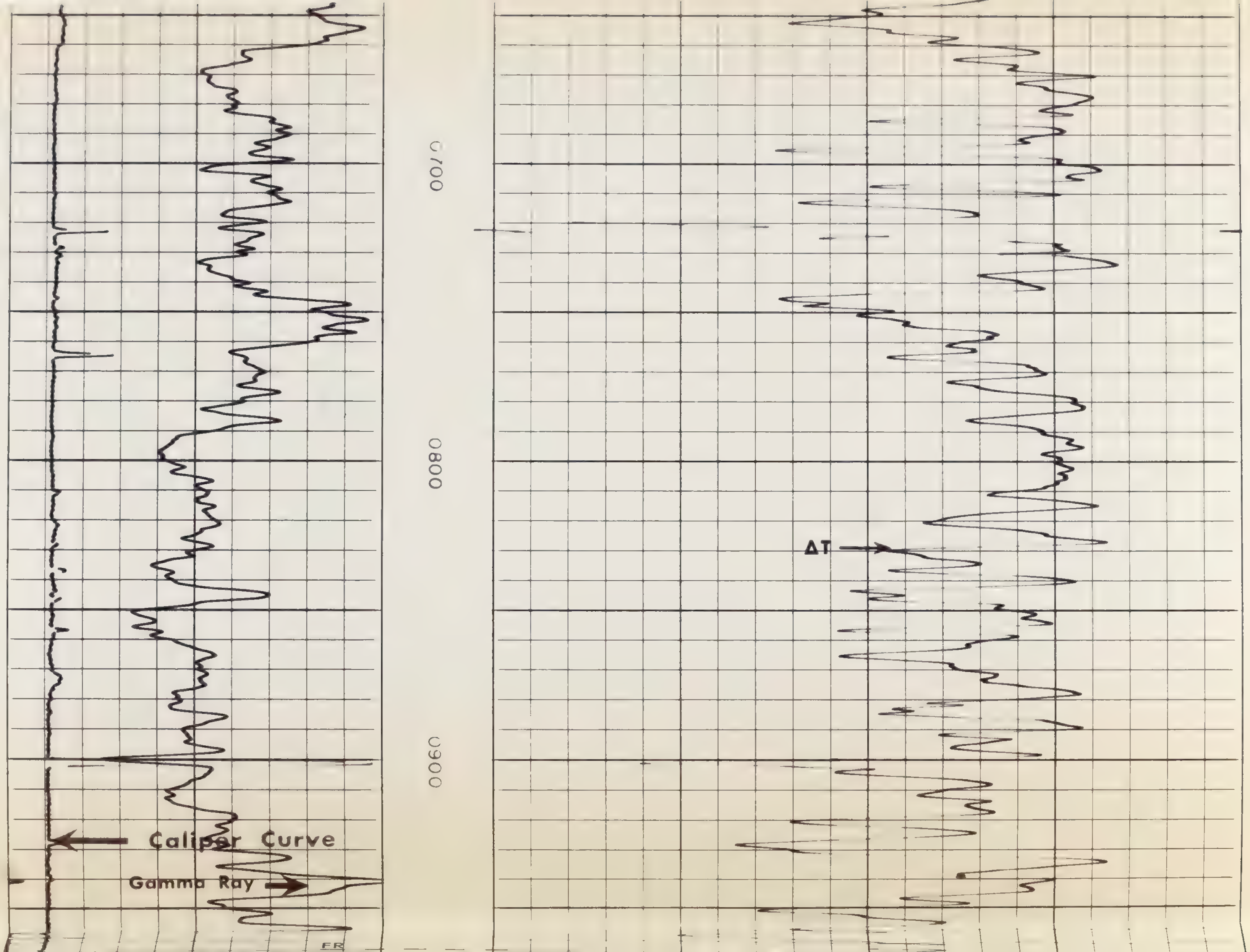
T 3 R₁ 2 R₂

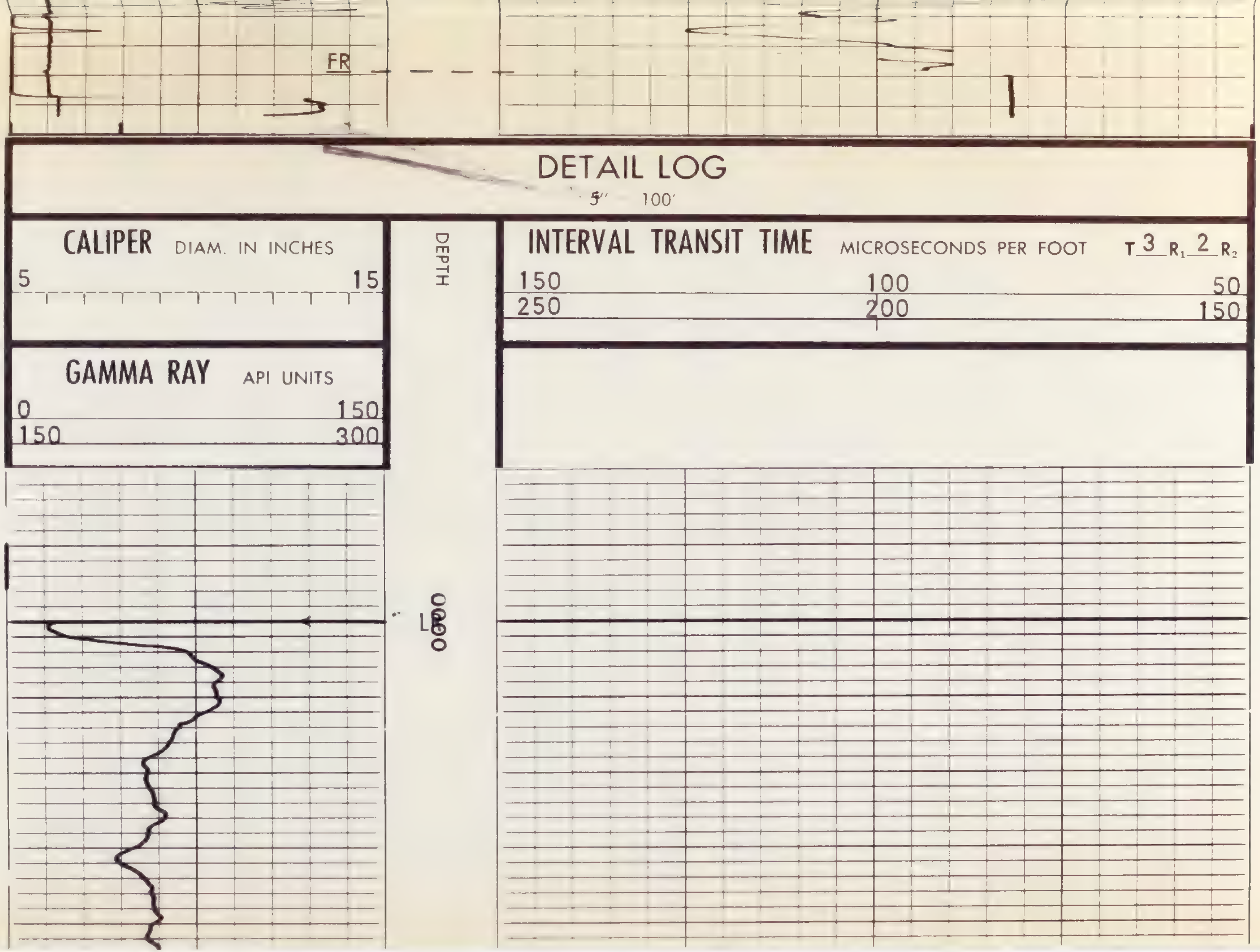
150 100 50

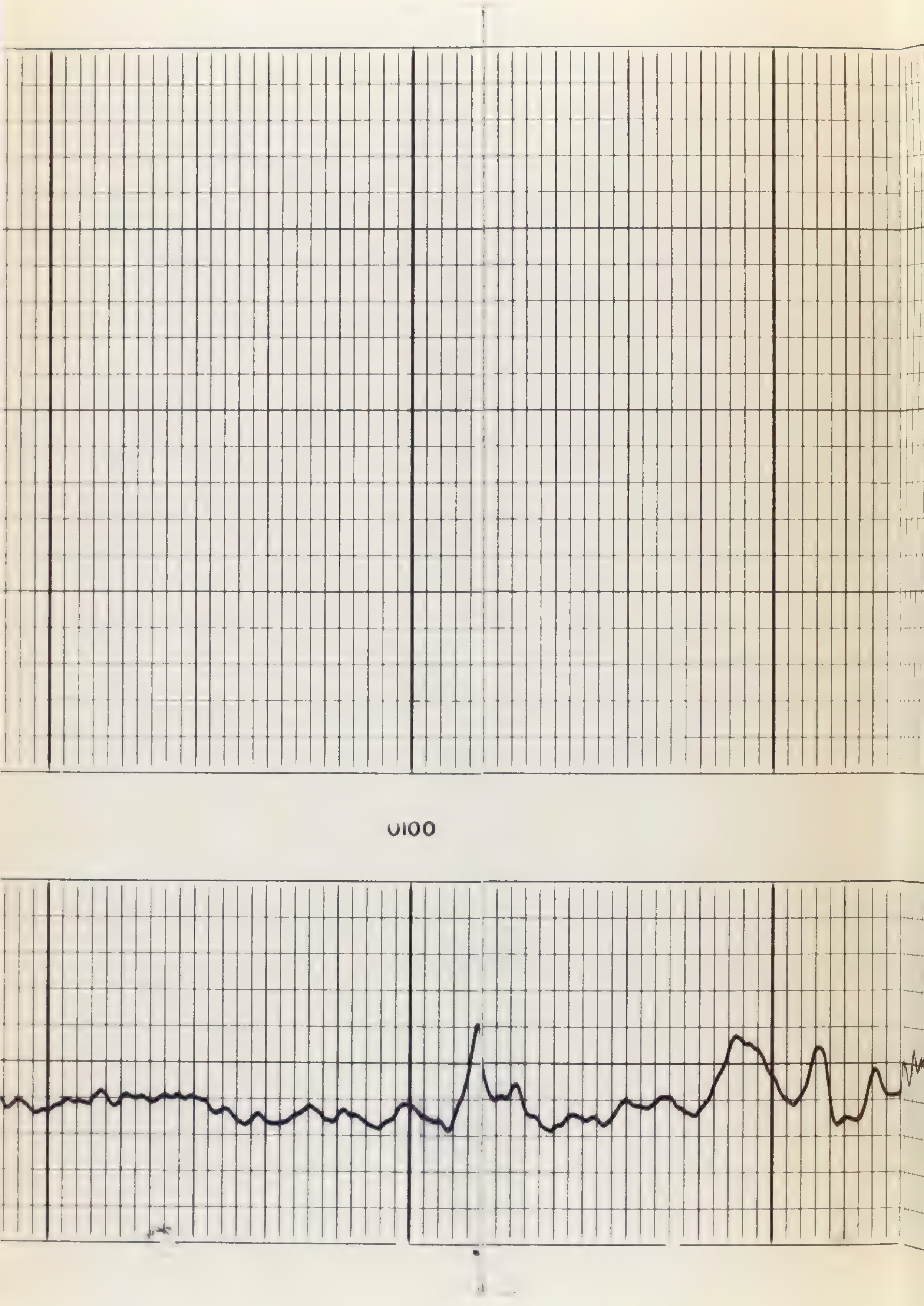
250 200 150


0100
0200
Casing
0300
ΔT


Caliper Curve
Gamma Ray
ΔT
0400
0500
0600


0700
0800
0900
ΔT
Caliper Curve
Gamma Ray


FR
DETAIL LOG
5″ 100′
CALIPER DIAM. IN INCHES
5
15
DEPTH
INTERVAL TRANSIT TIME MICROSECONDS PER FOOT
T 3 R₁ 2 R₂
150
100
50
250
200
150
GAMMA RAY API UNITS
0
150
150
300
0000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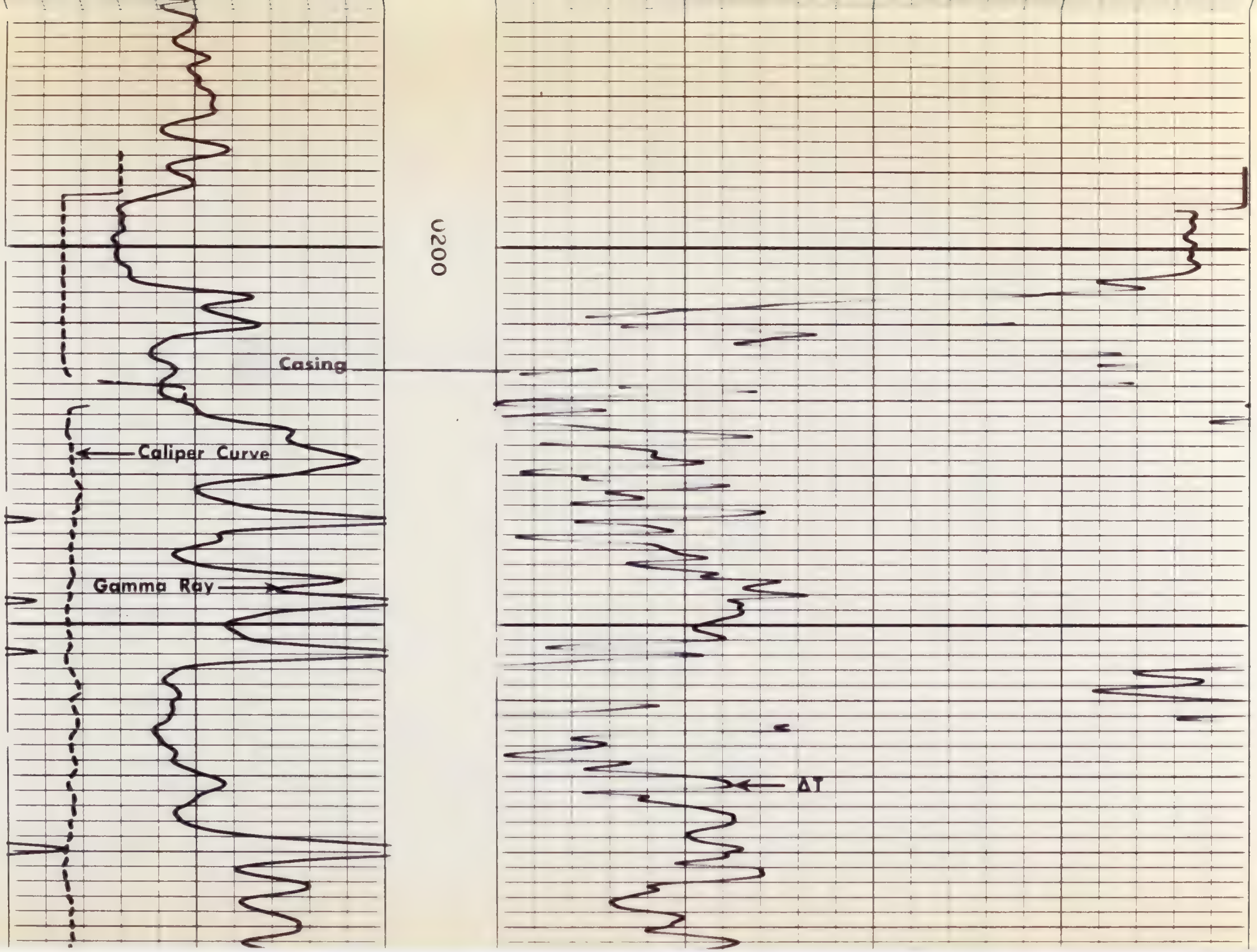
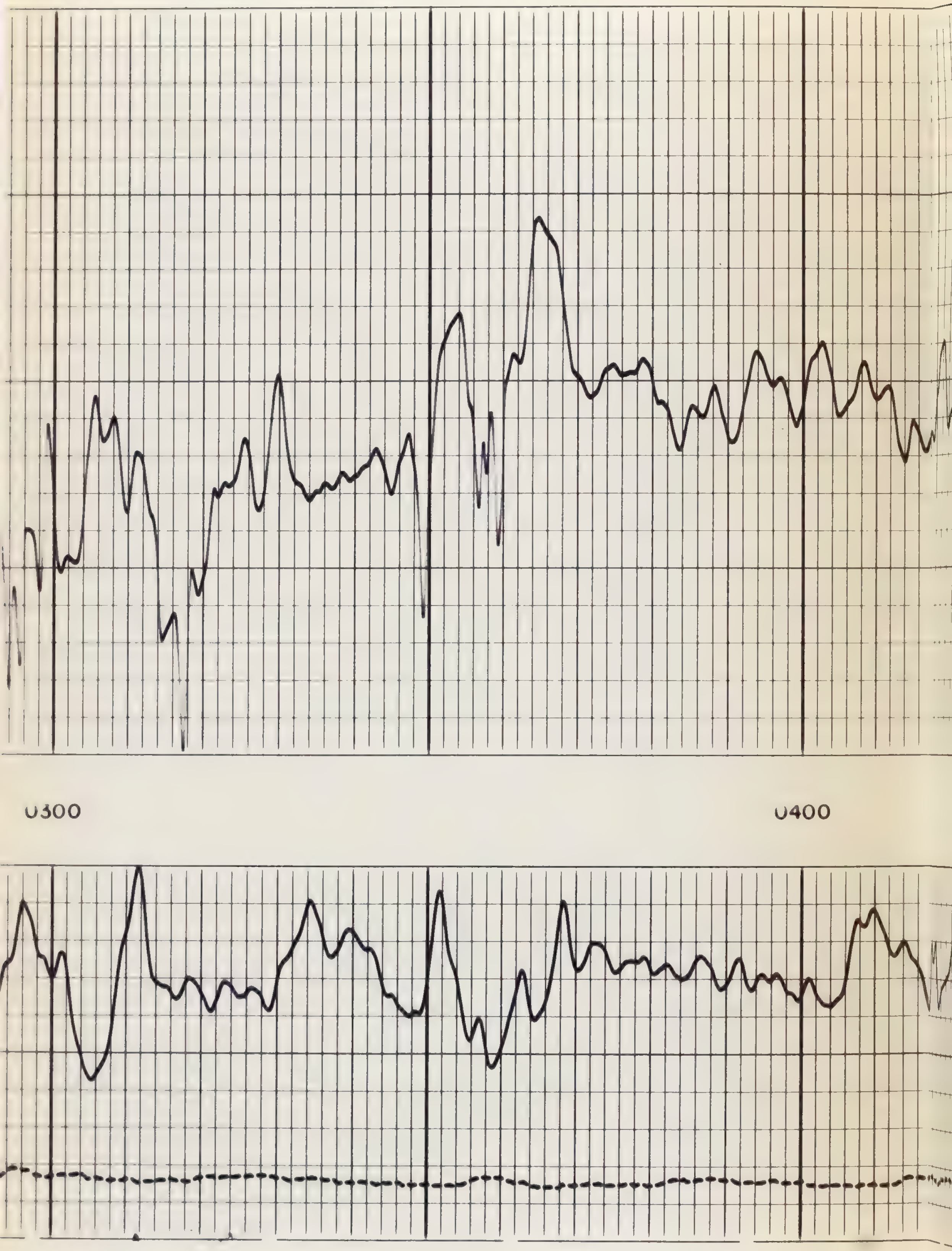
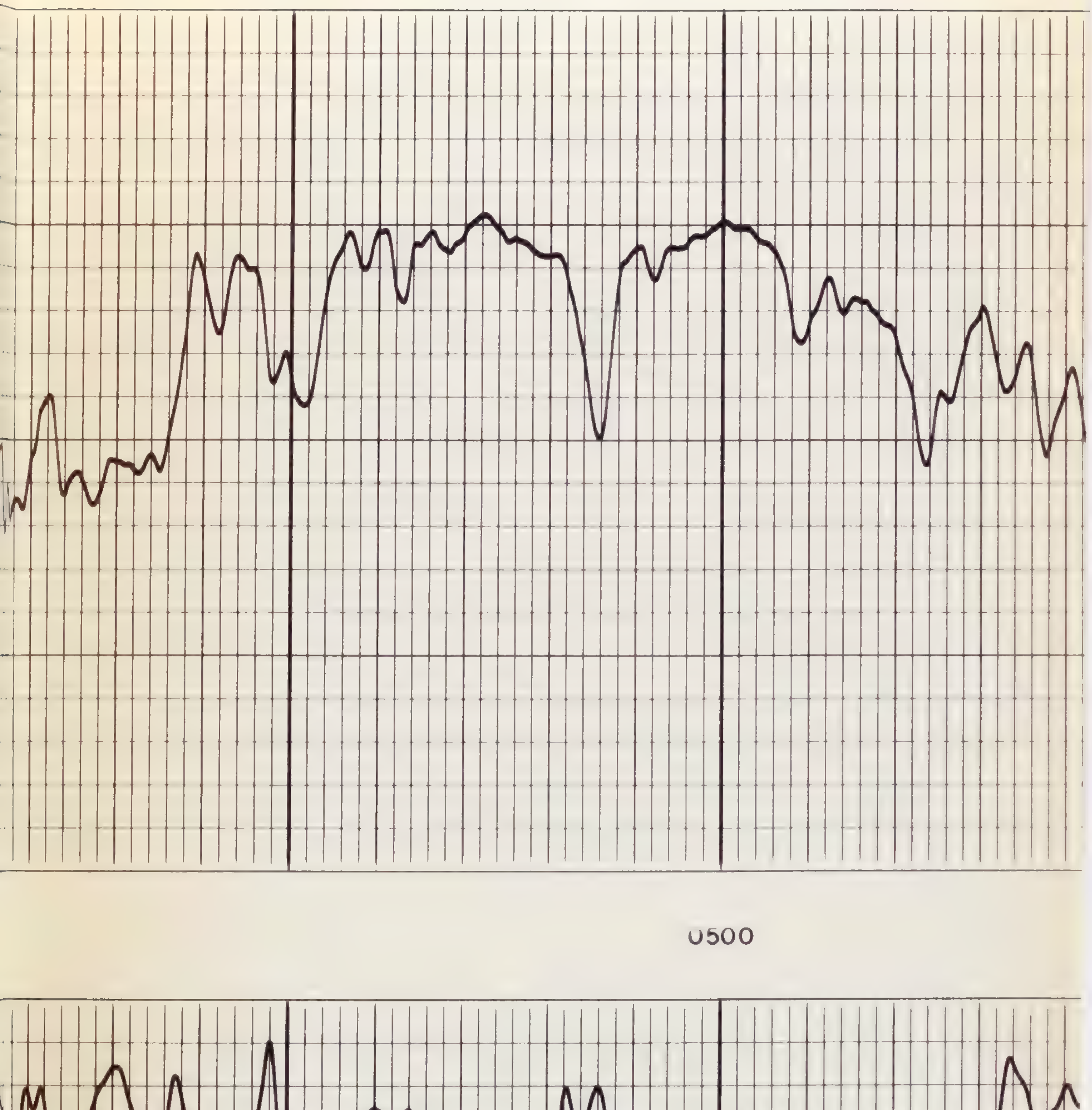

0200
Casing
Caliper Curve
Gamma Ray
ΔT


0300
0400



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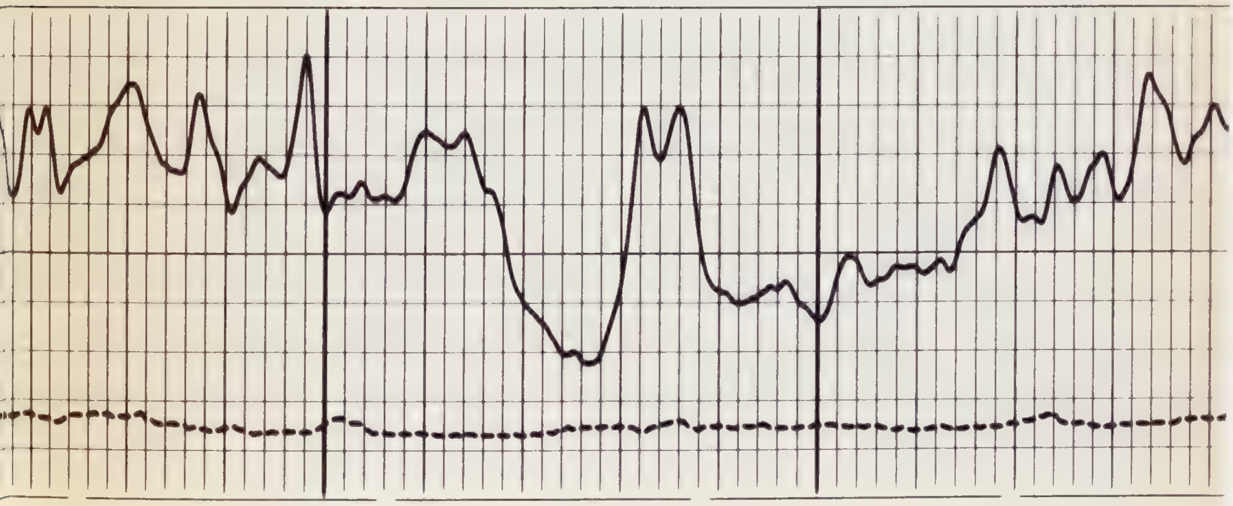

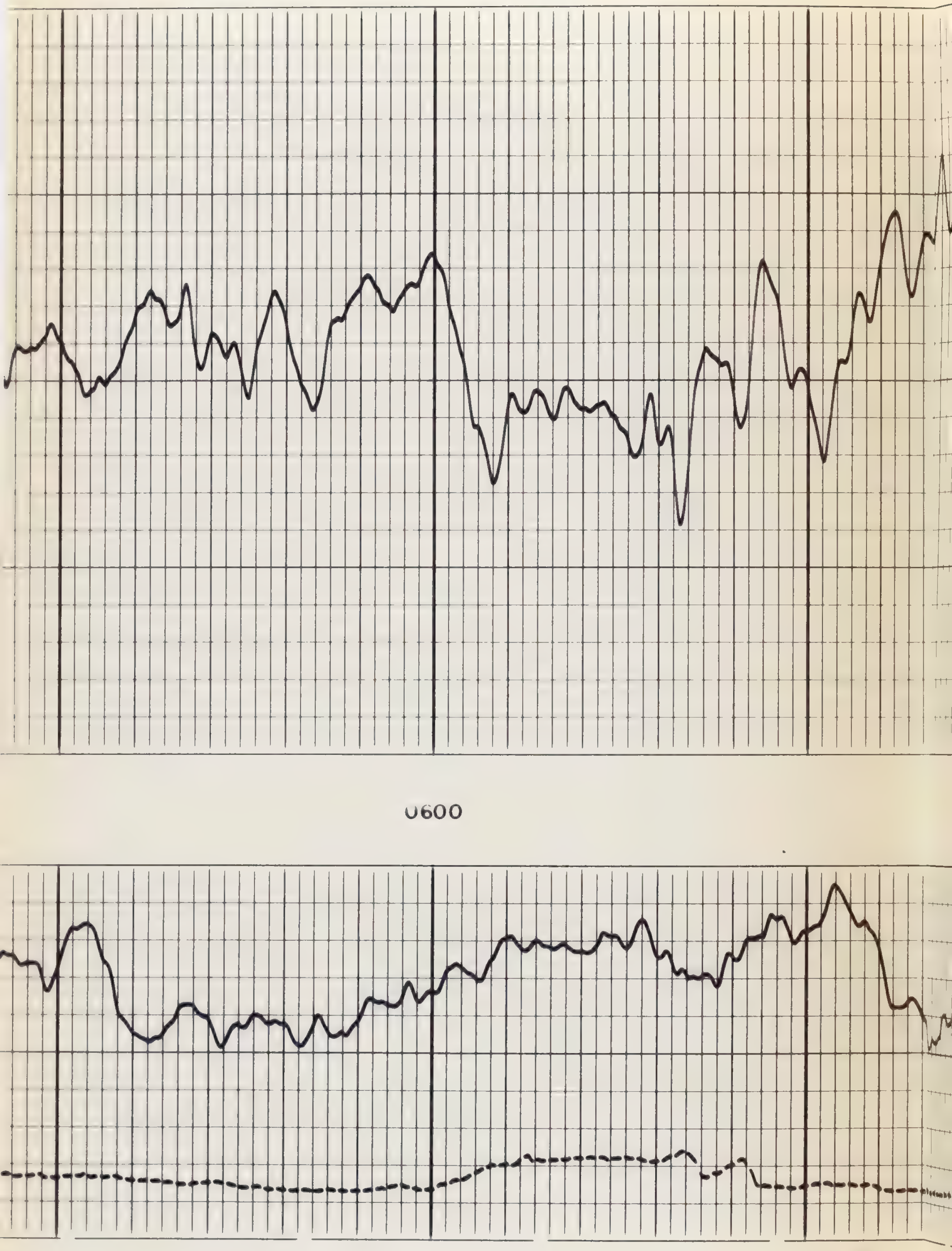
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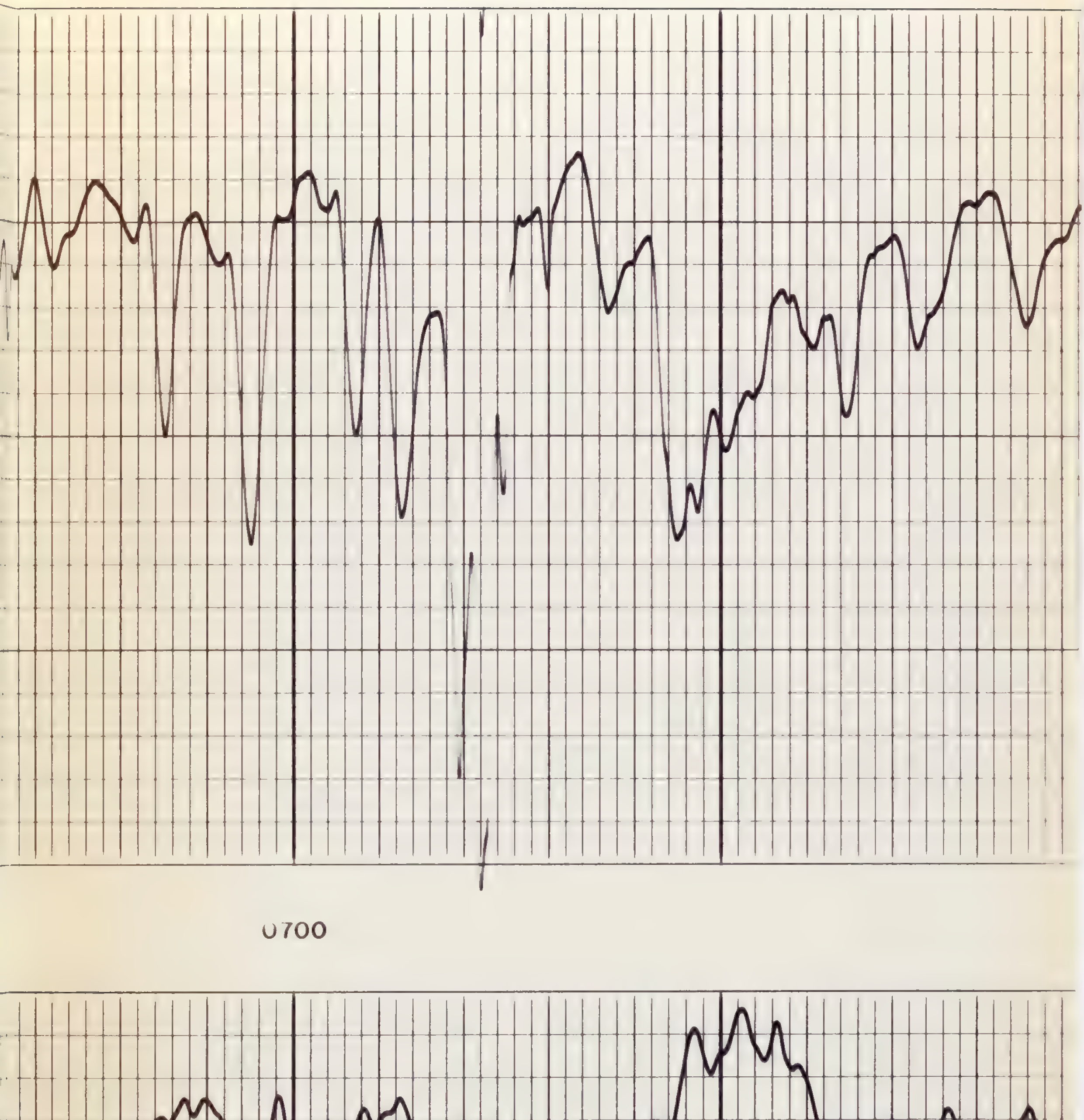
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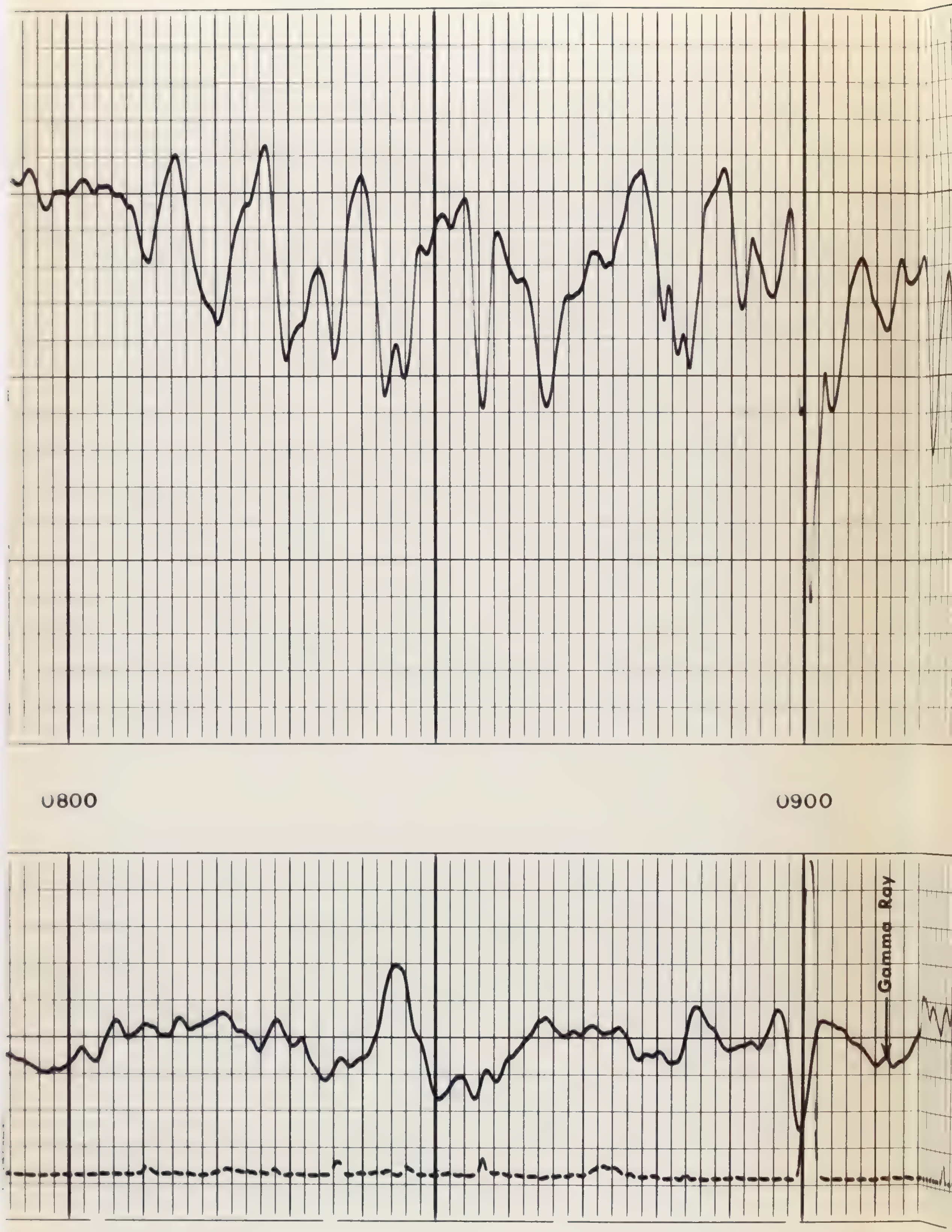
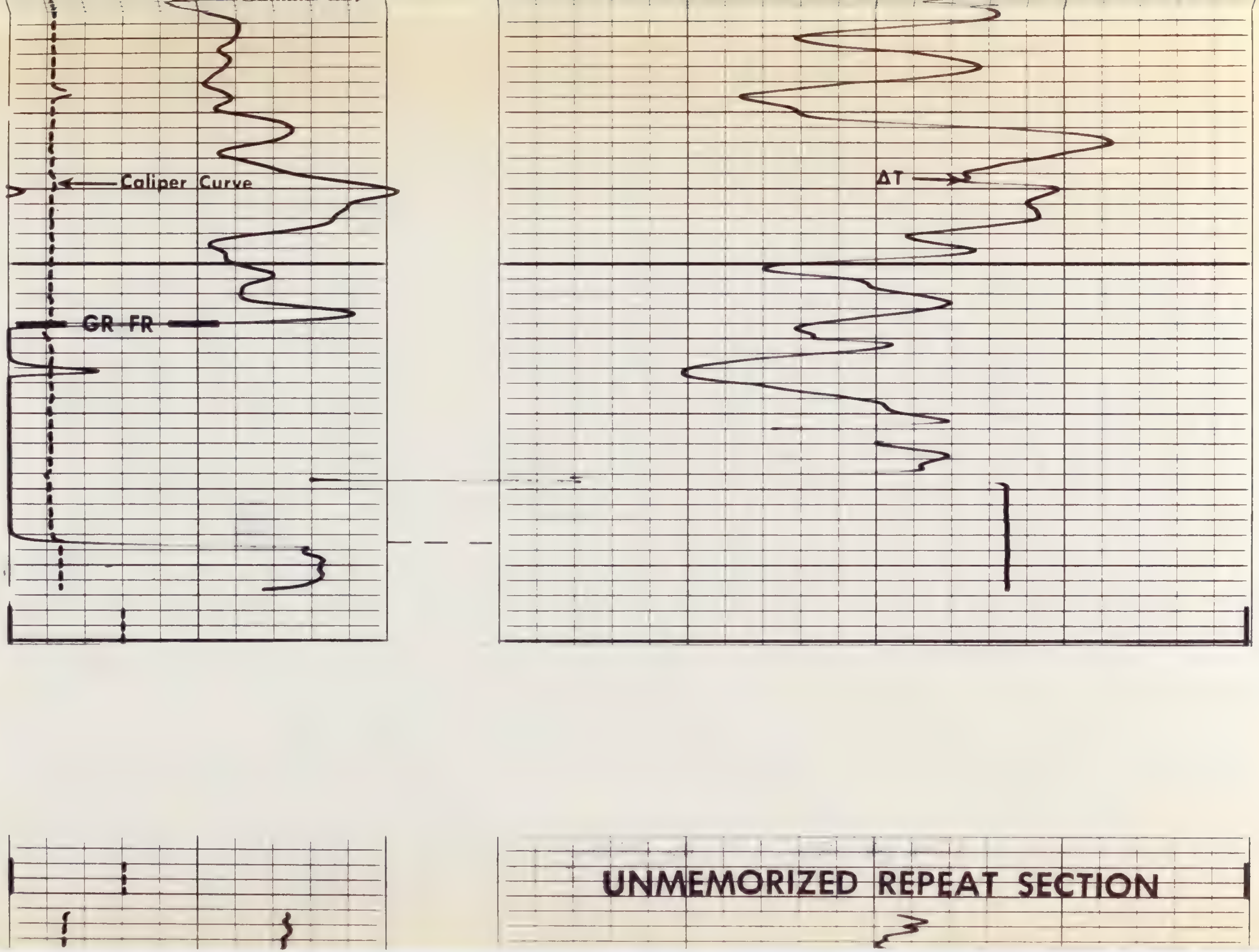
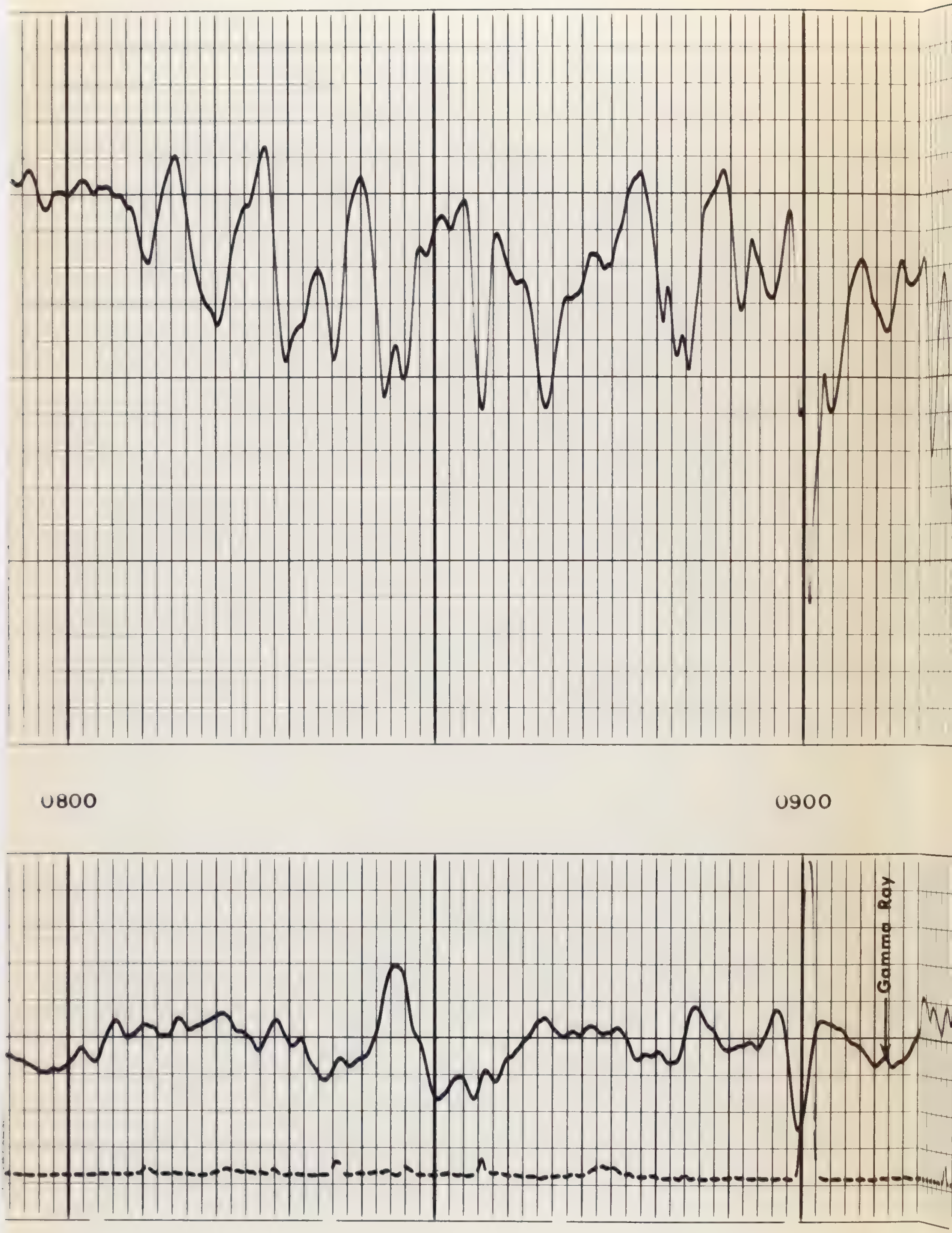
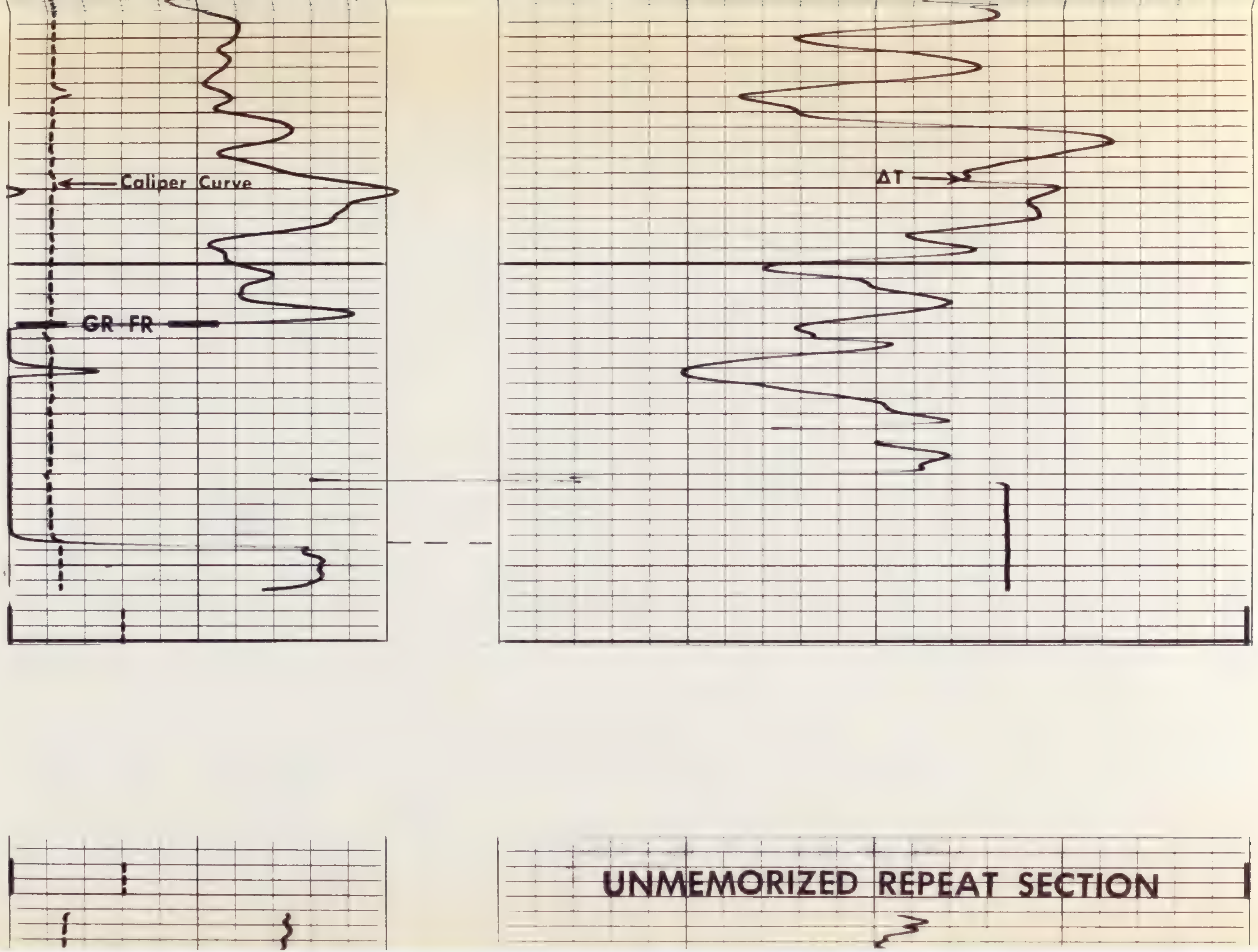
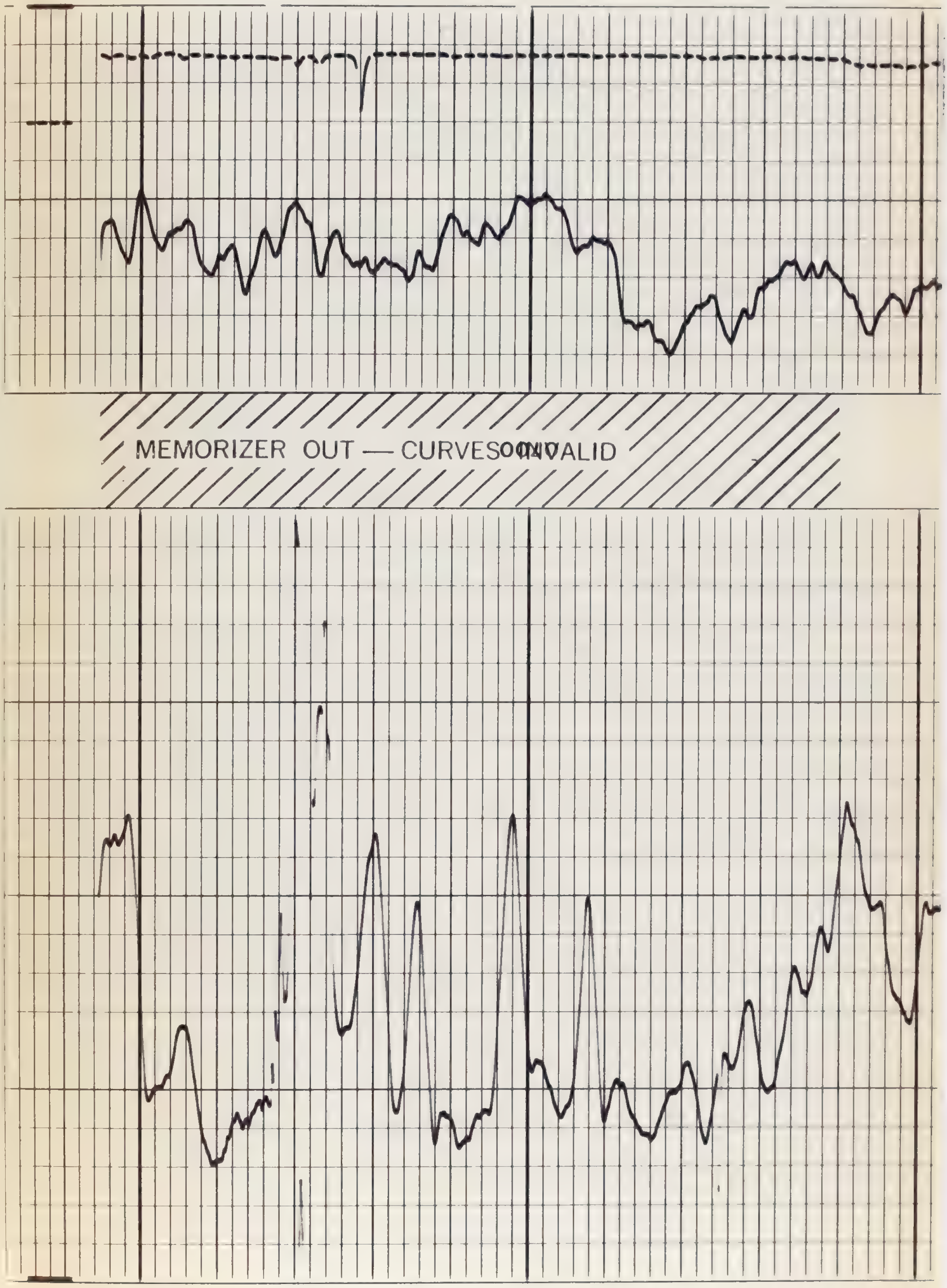

0800
0900
Gamma Ray


Caliper Curve
ΔT
GR FR
UNMEMORIZED REPEAT SECTION


0800
0900
Gamma Ray


Caliper Curve
GR FR
ΔT
UNMEMORIZED REPEAT SECTION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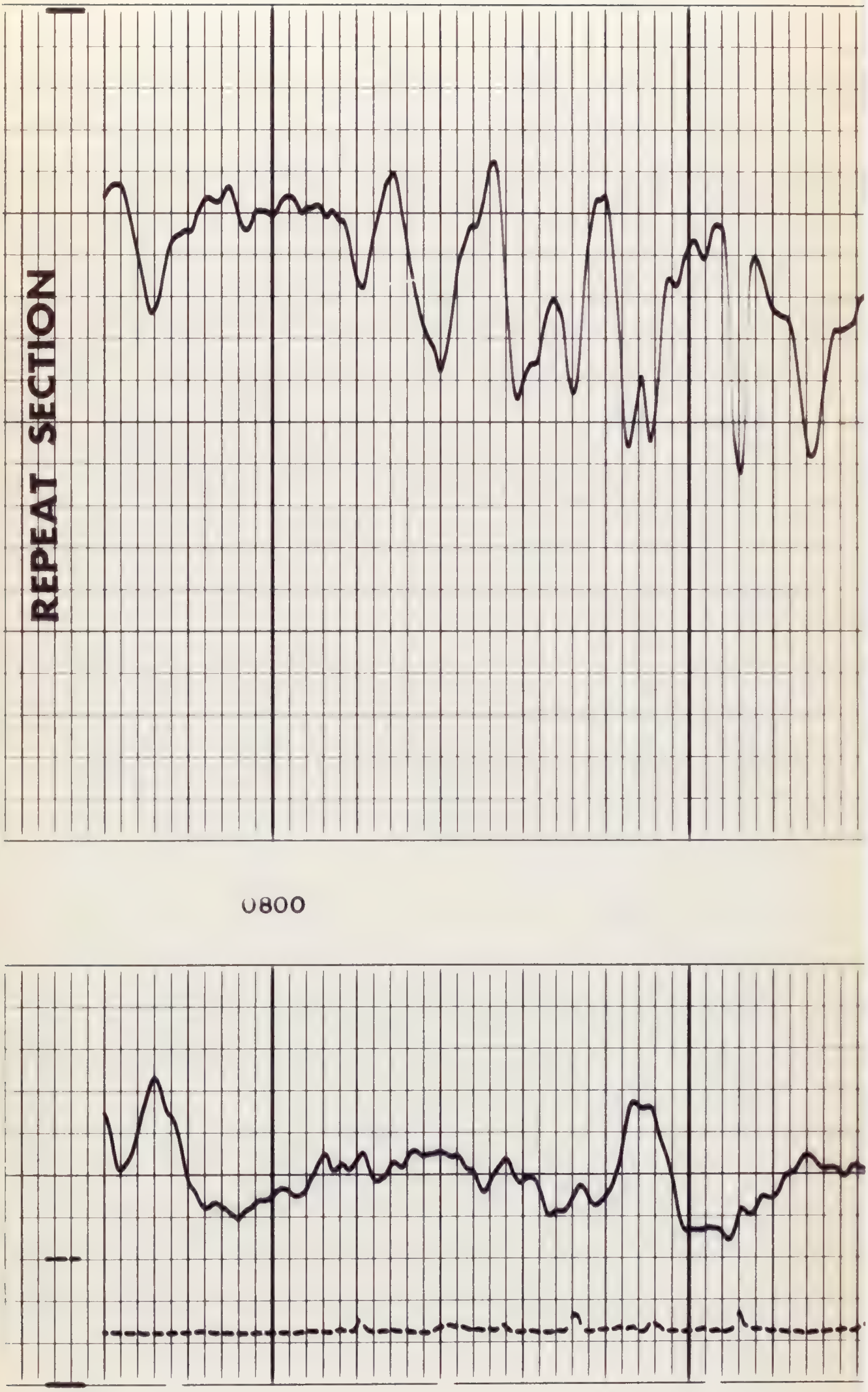
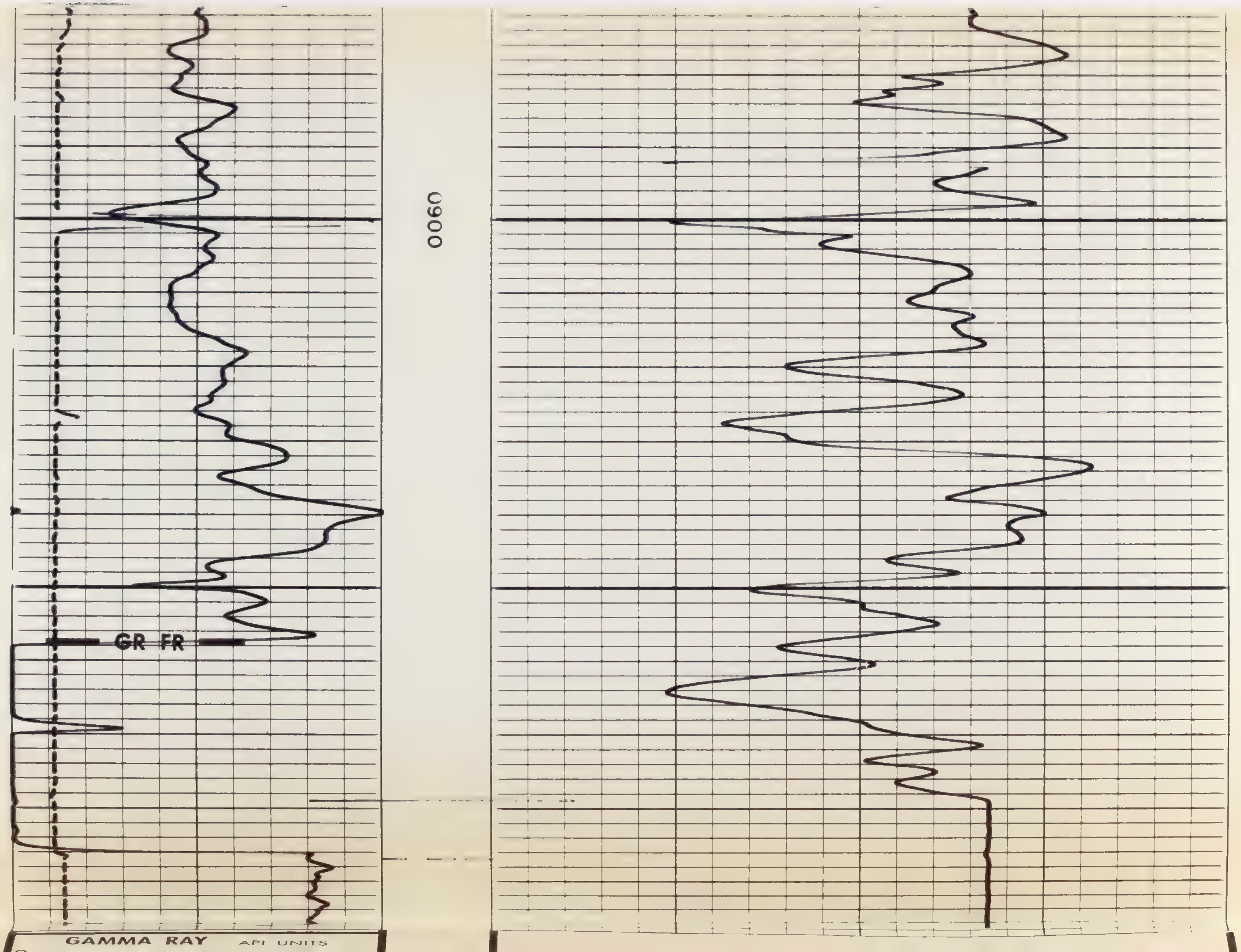
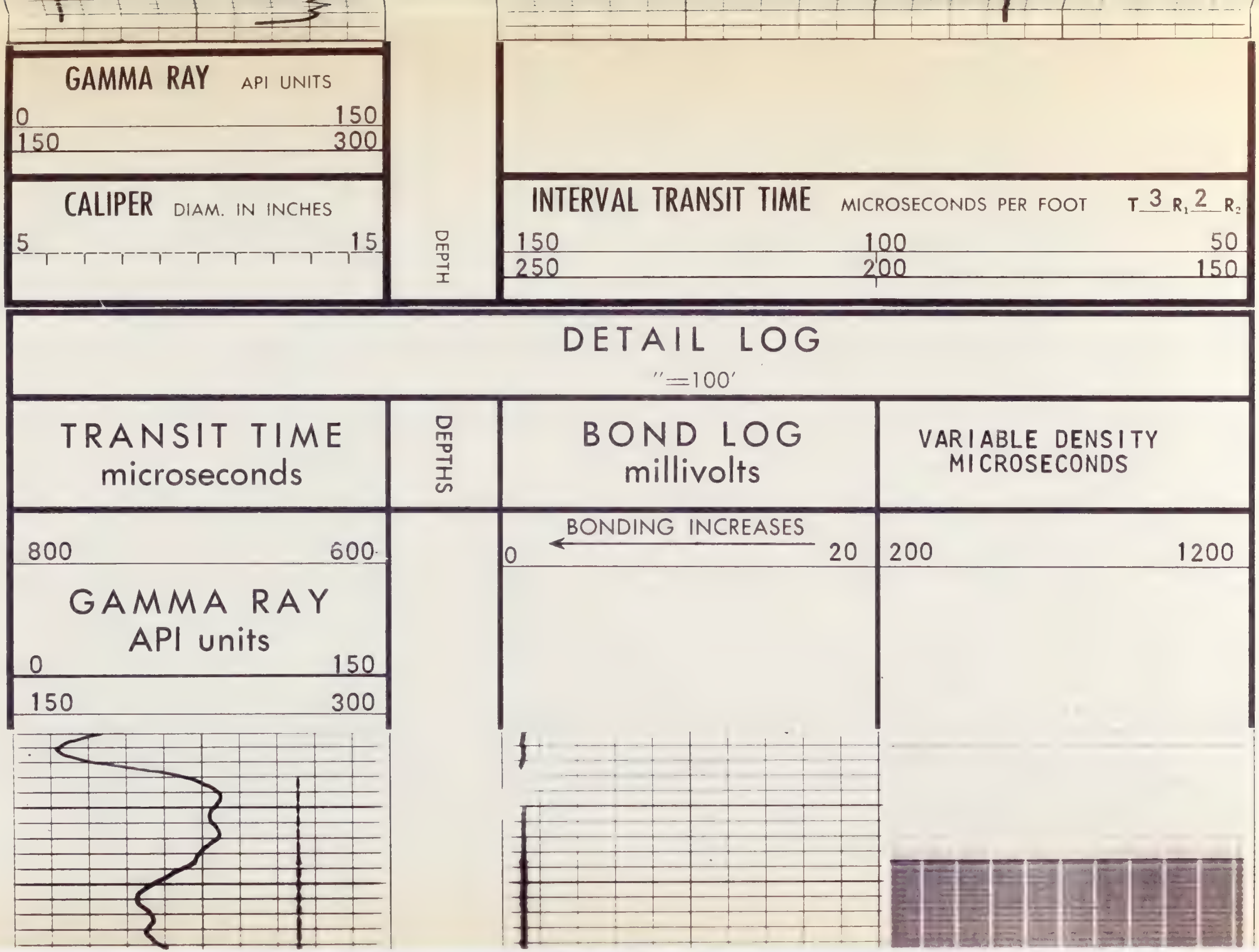
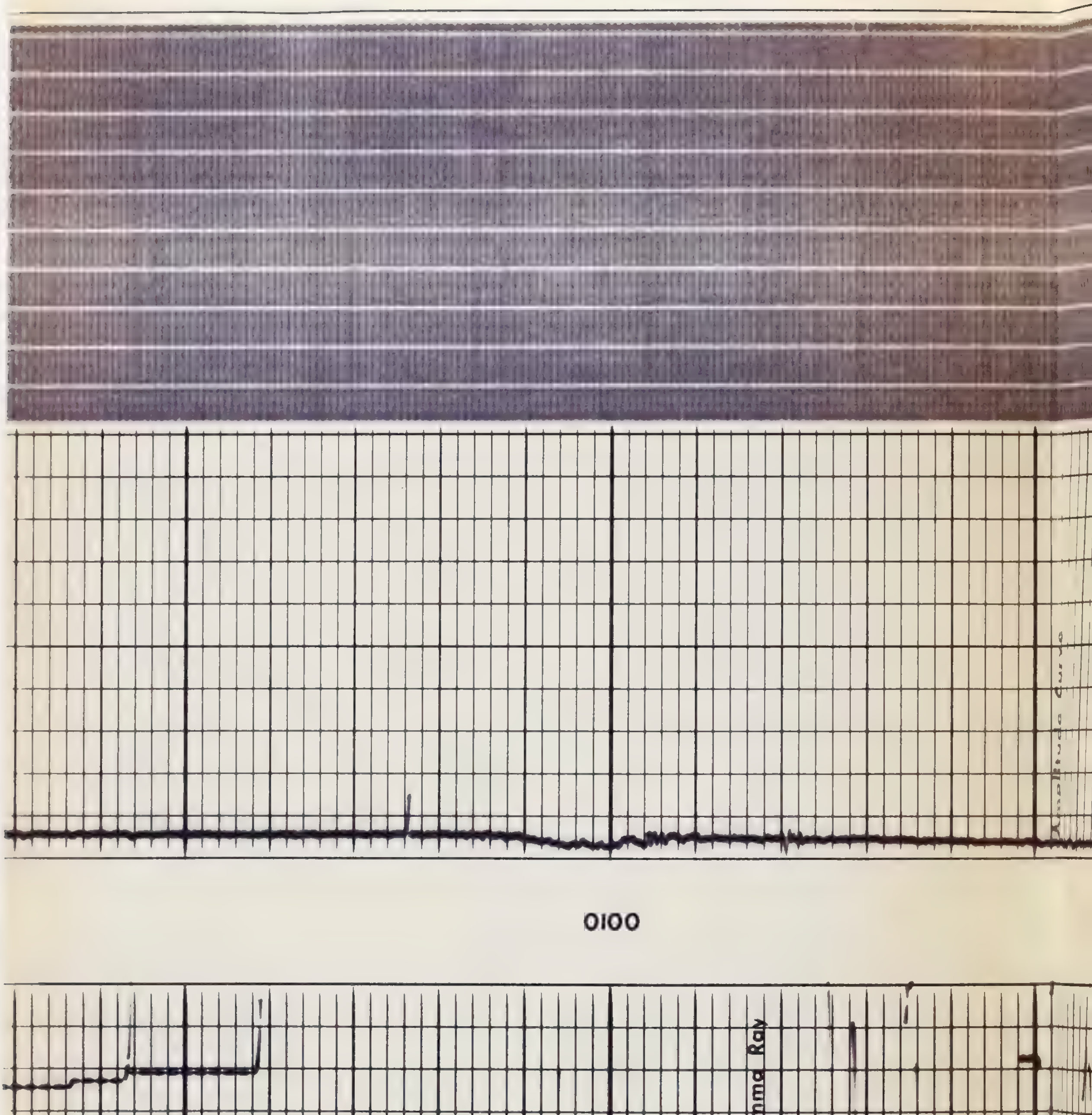
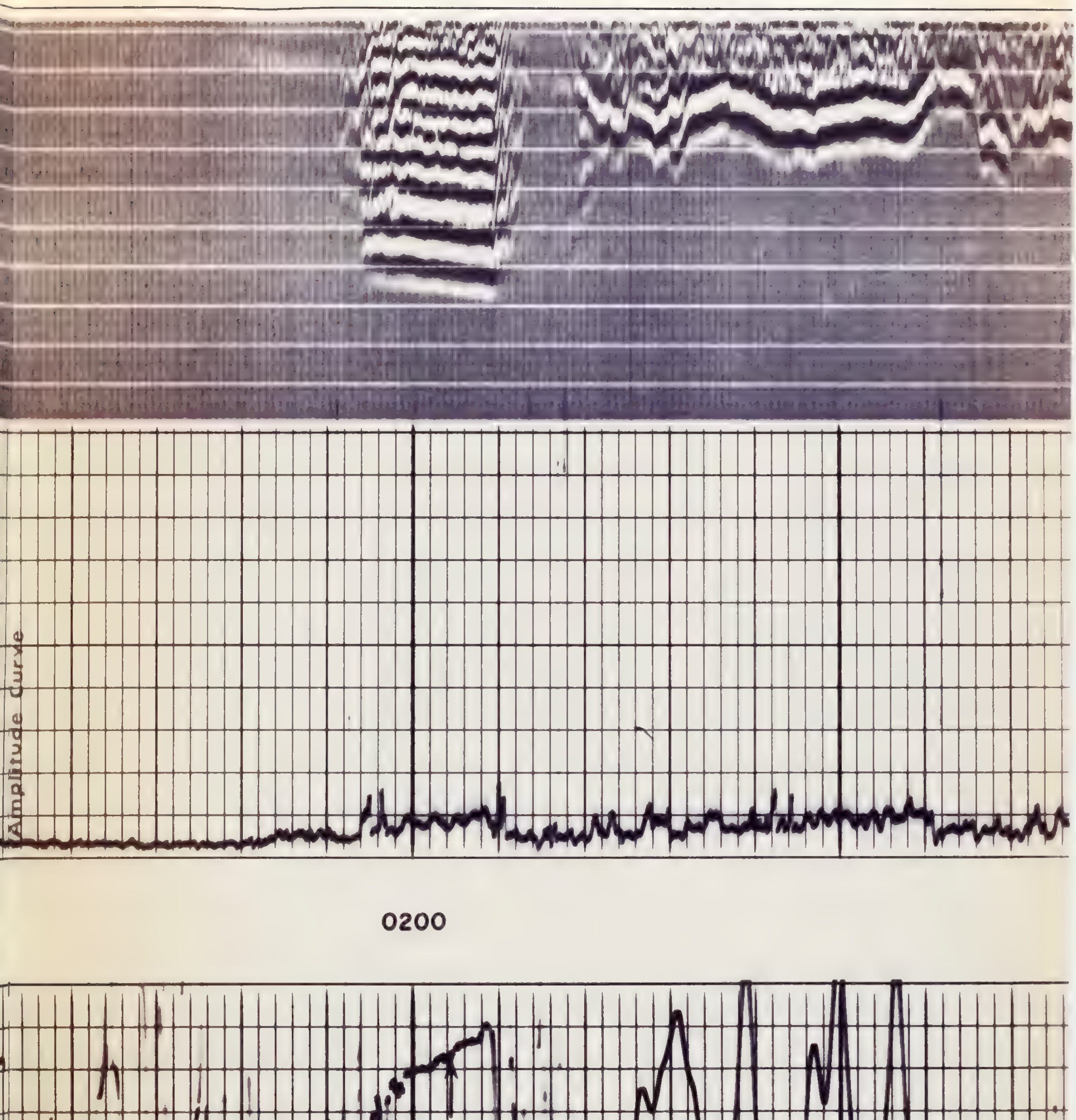
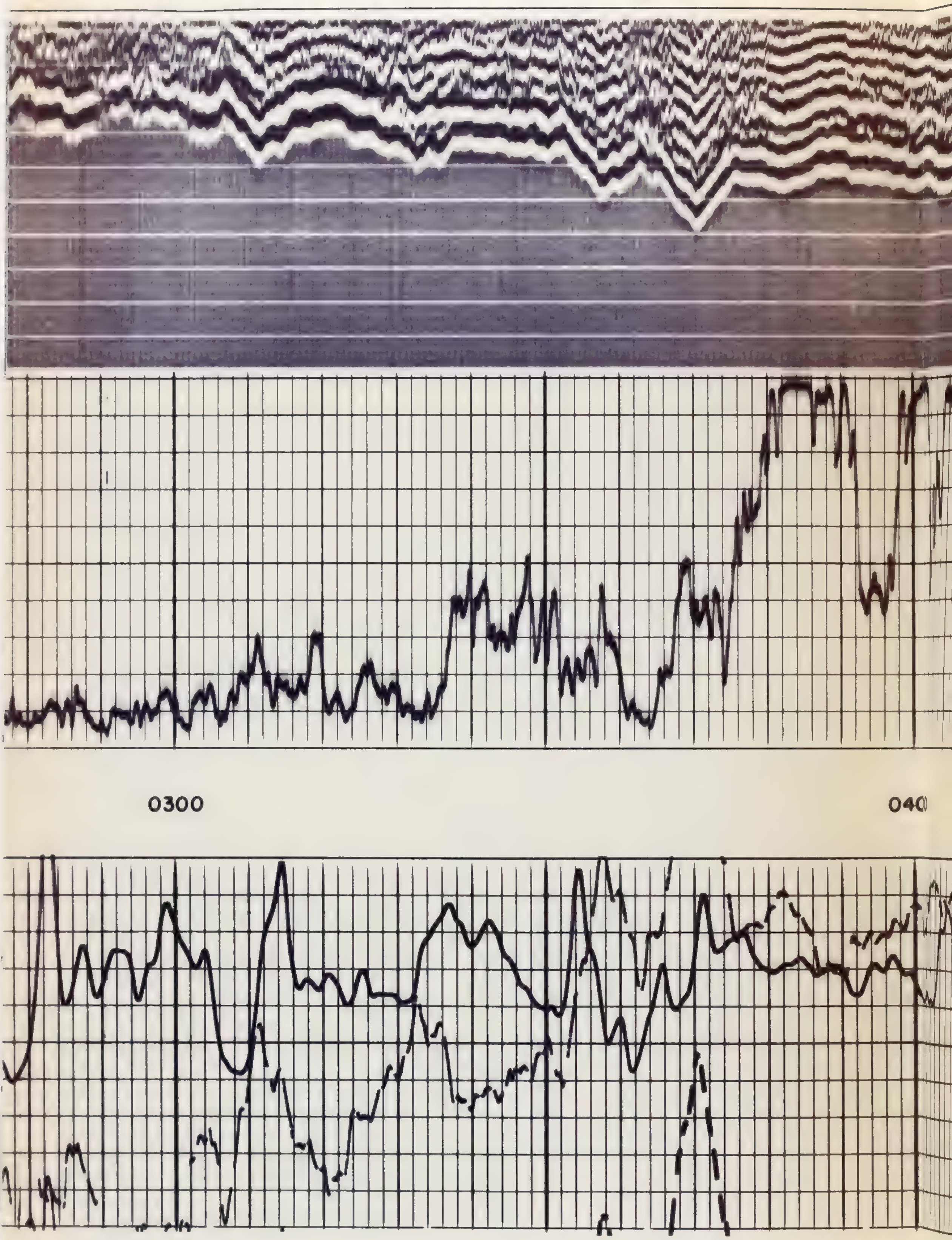

REPEAT SECTION
0800


0900
GR FR
GAMMA RAY
API UNITS


GAMMA RAY API UNITS
0
150
150
300
CALIPER DIAM. IN INCHES
5
15
DEPTH
INTERVAL TRANSIT TIME MICROSECONDS PER FOOT
T 3 R₁ 2 R₂
150
100
50
250
200
150
DETAIL LOG
" = 100'
TRANSIT TIME microseconds
DEPTHS
BOND LOG millivolts
VARIABLE DENSITY MICROSECONDS
800
600
BONDING INCREASES
0
20
200
1200
GAMMA RAY API units
0
150
150
300


Amplitude Curve
0100
Gamma Ray


Amplitude curve
0200
ΔT


0300
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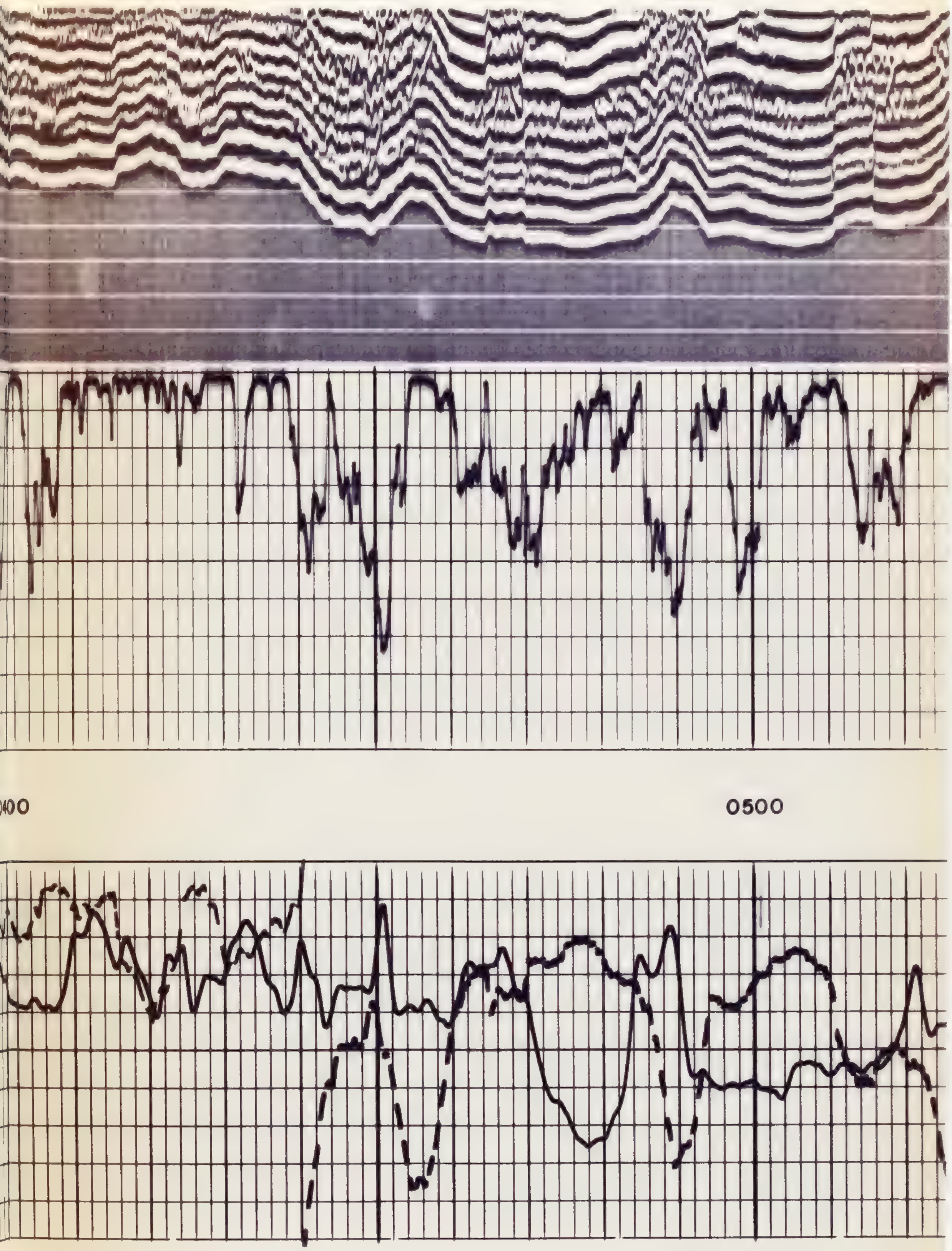
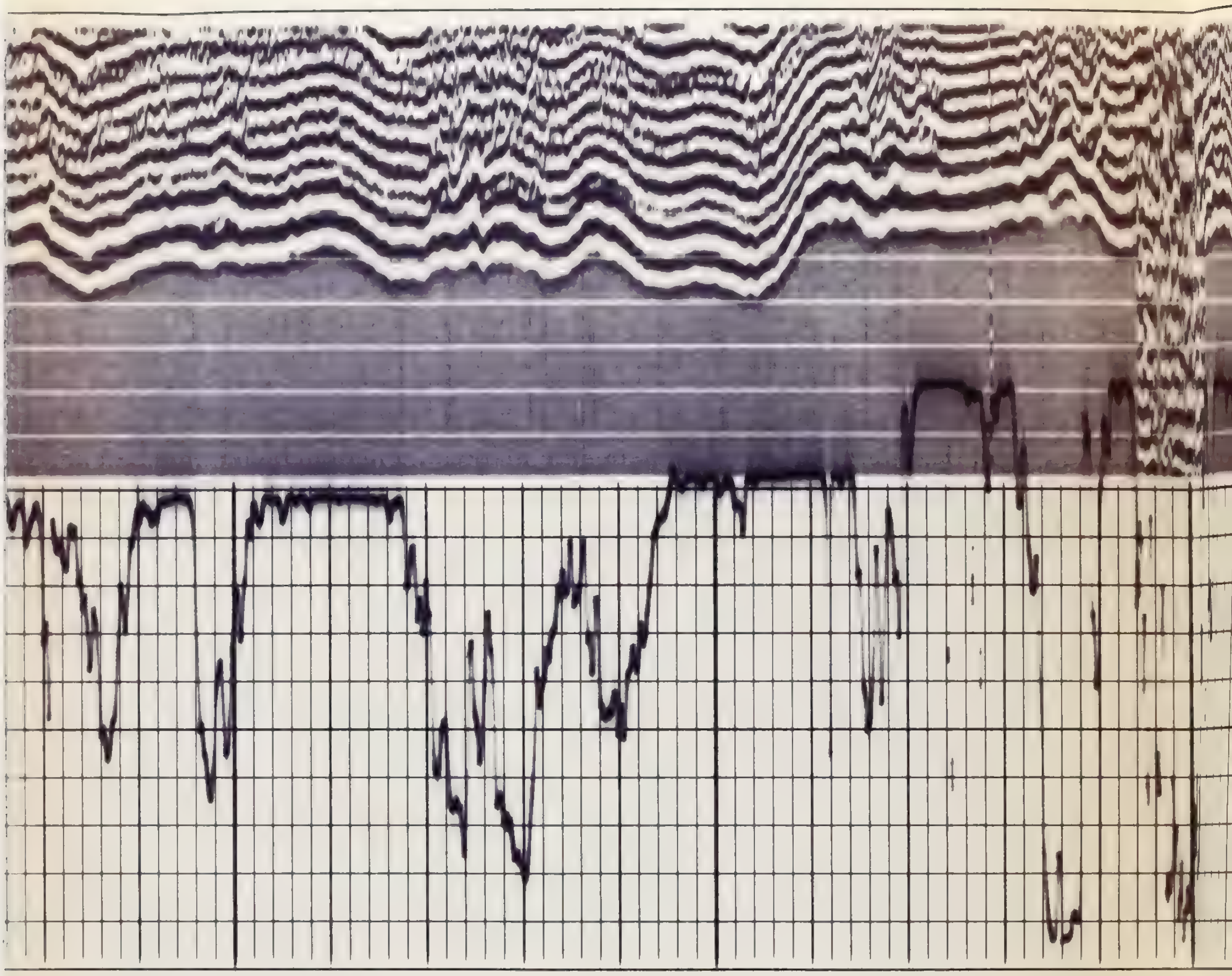

0400
0500



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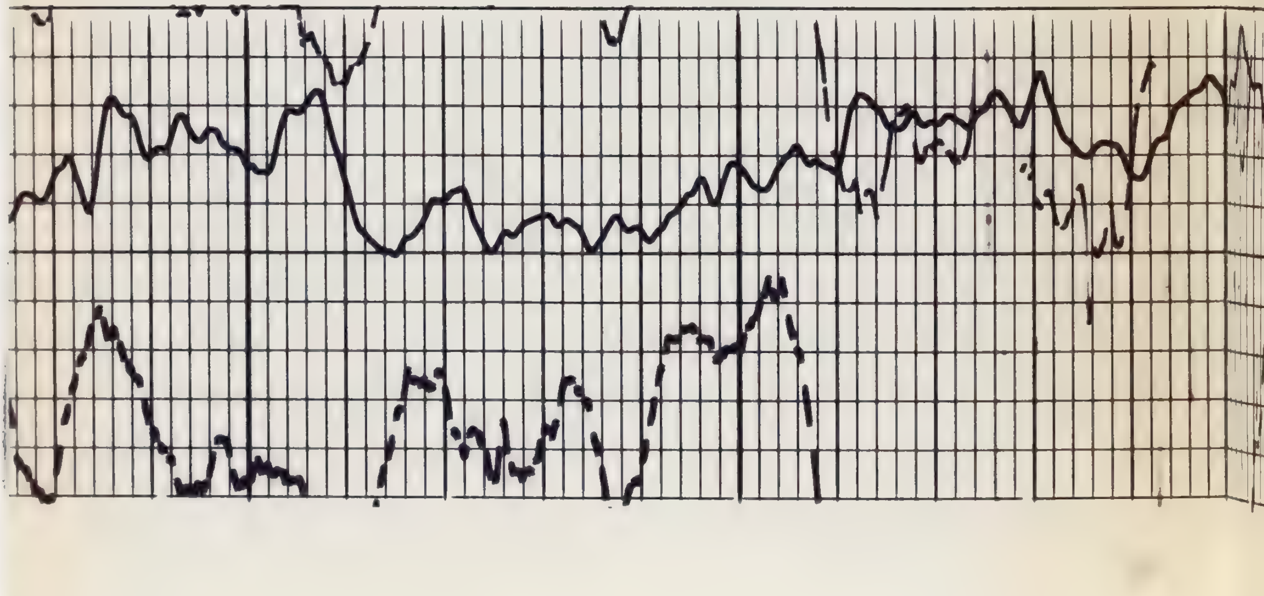

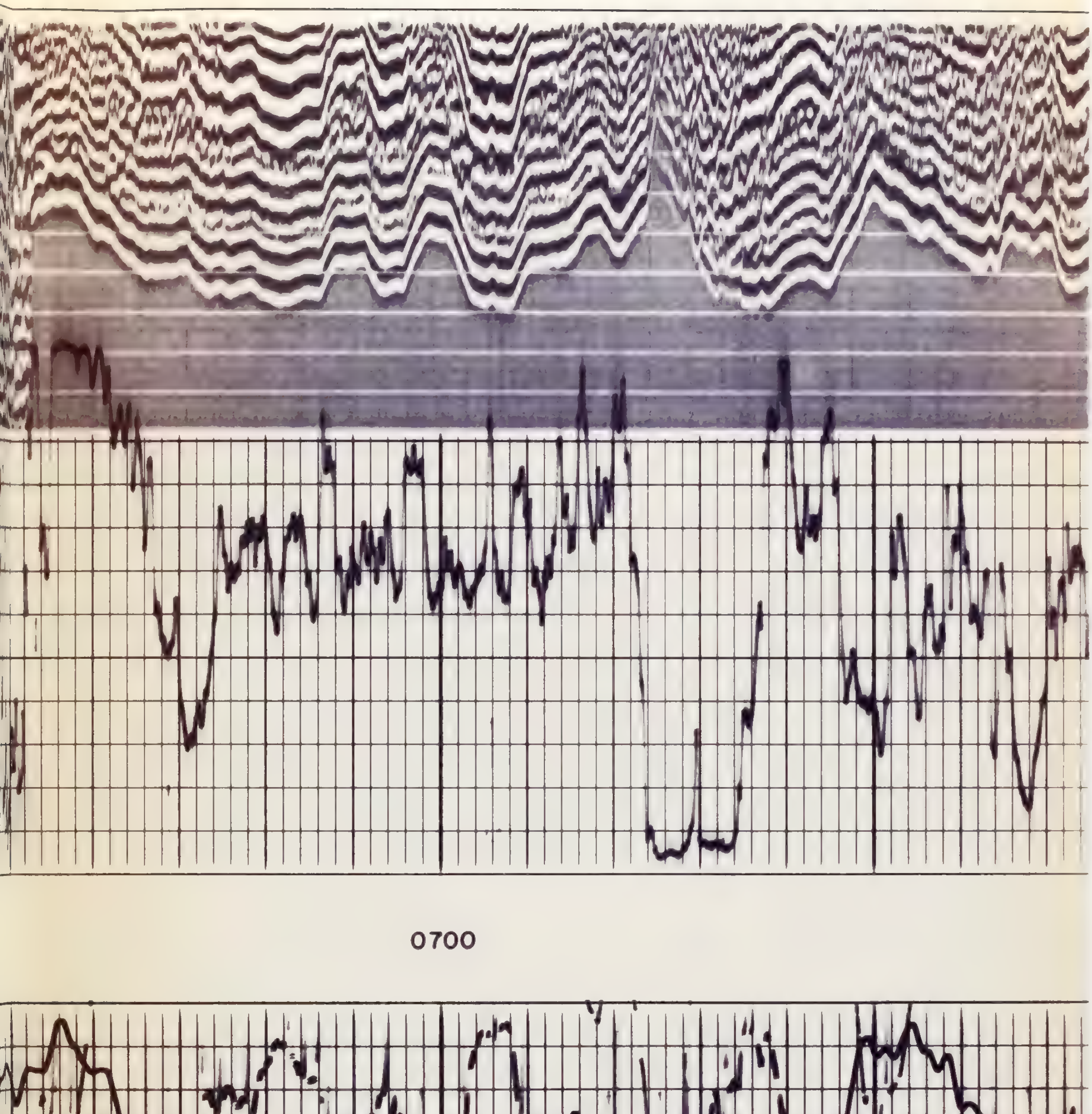

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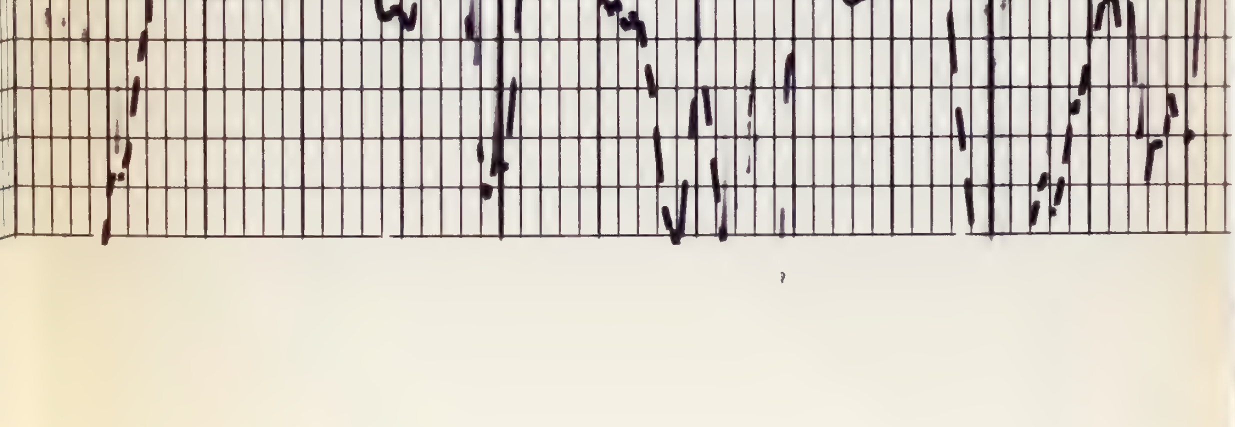
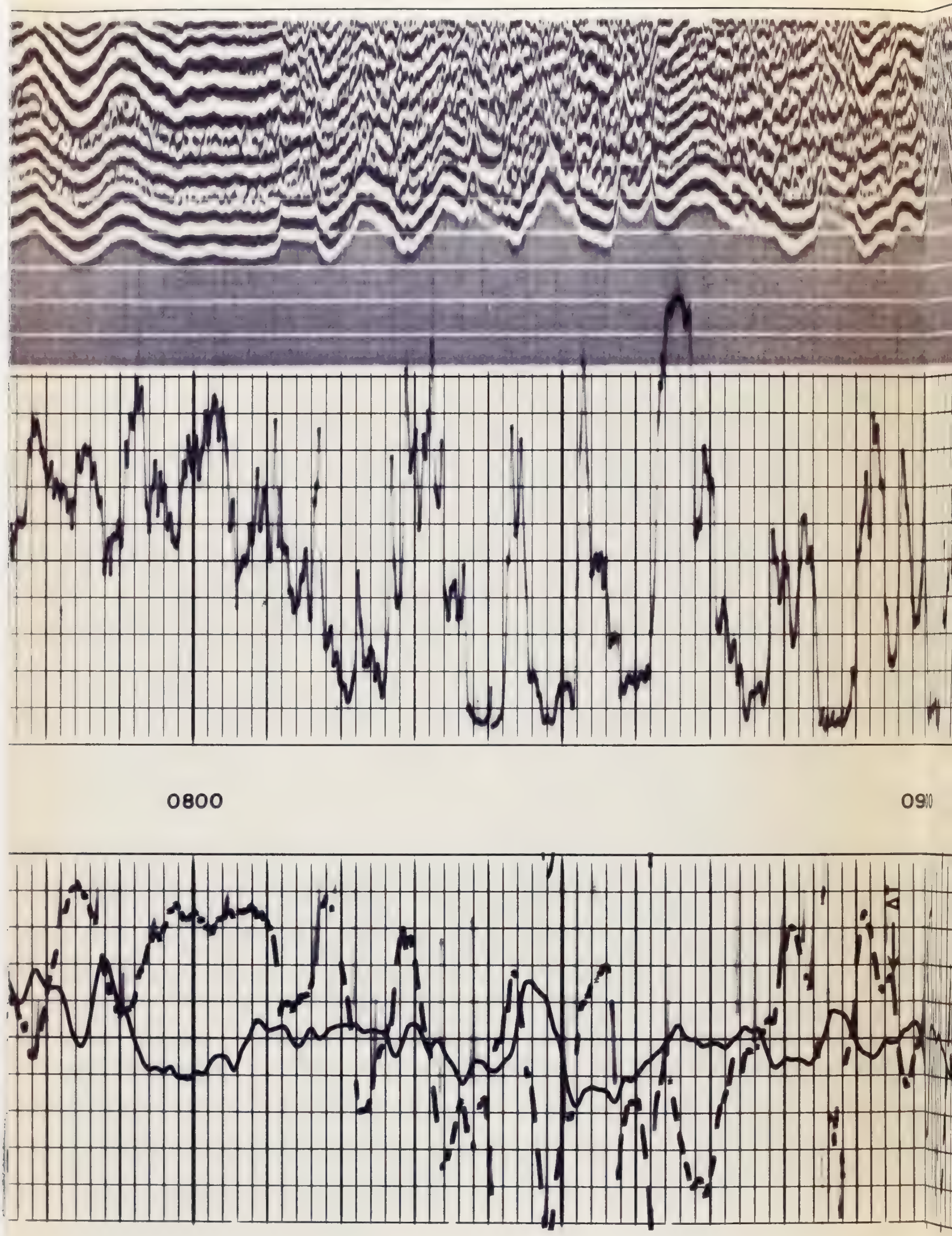
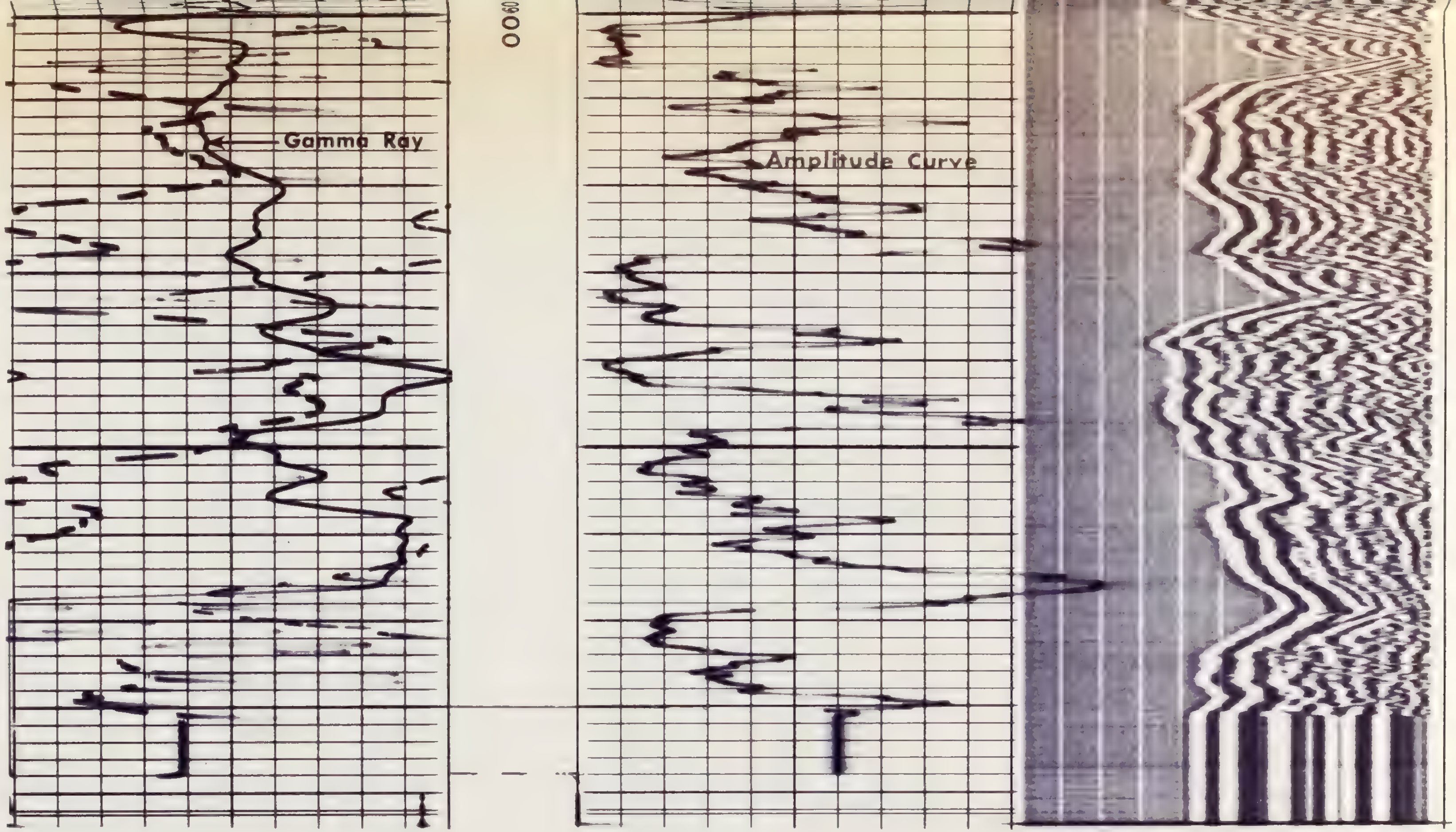
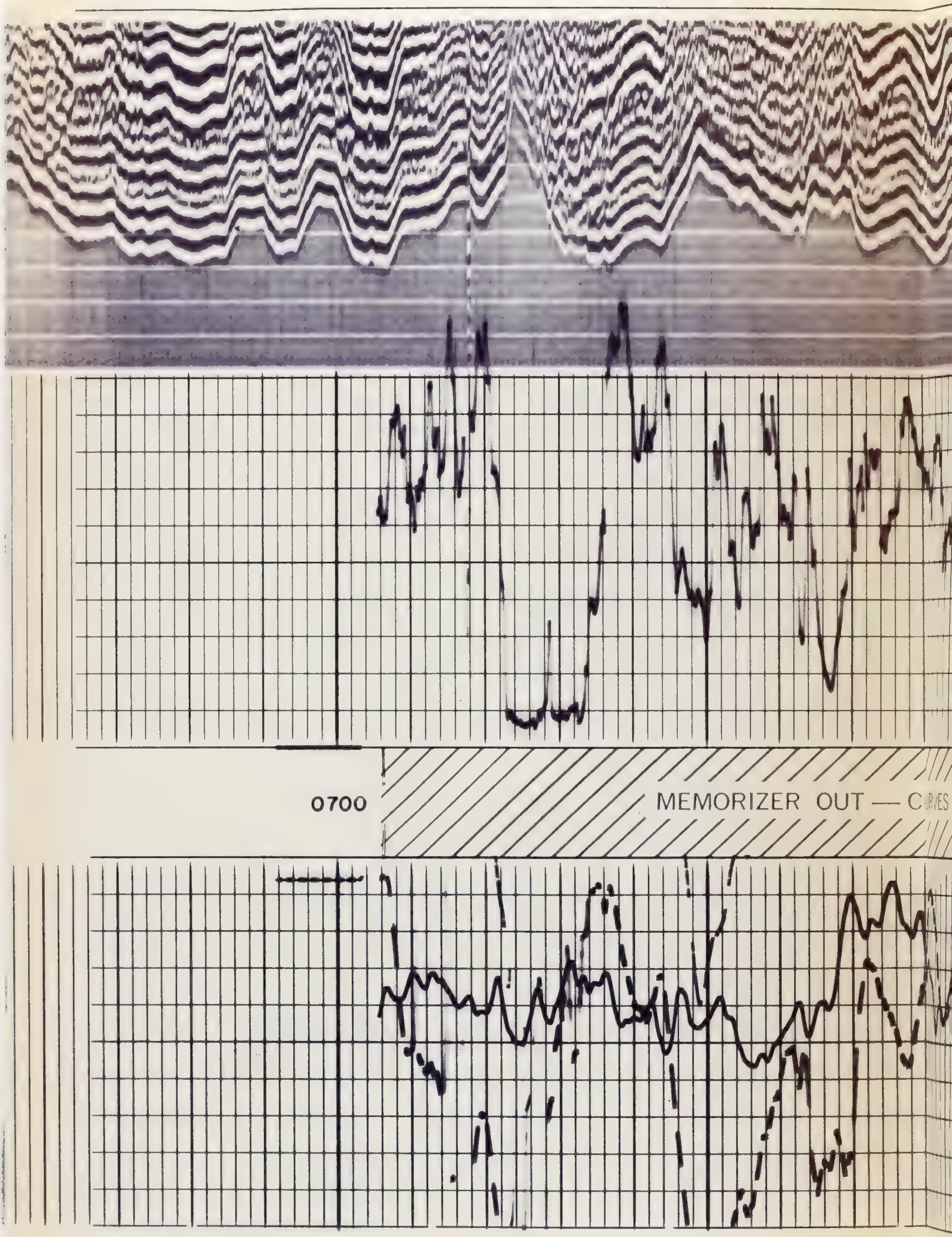
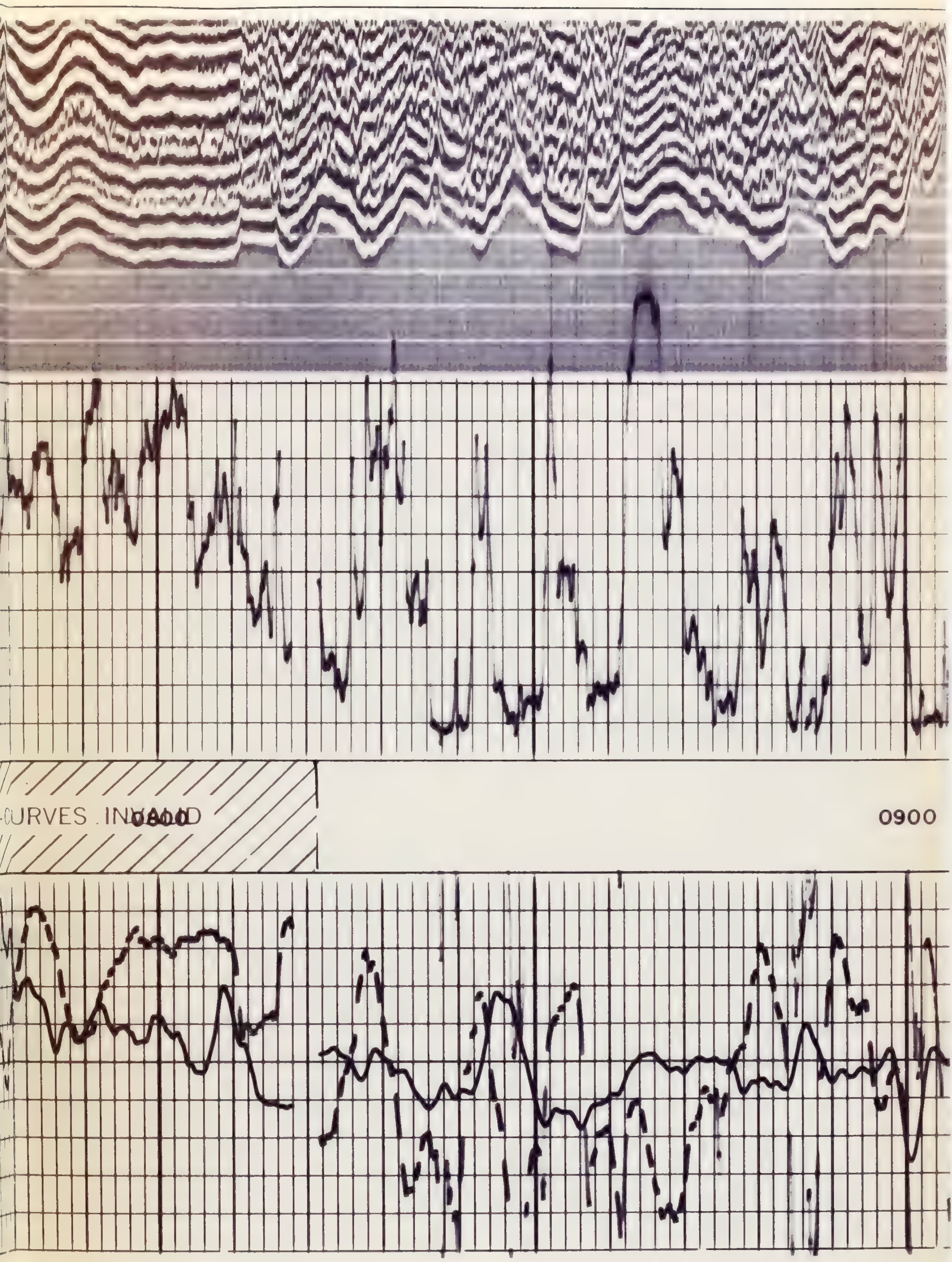


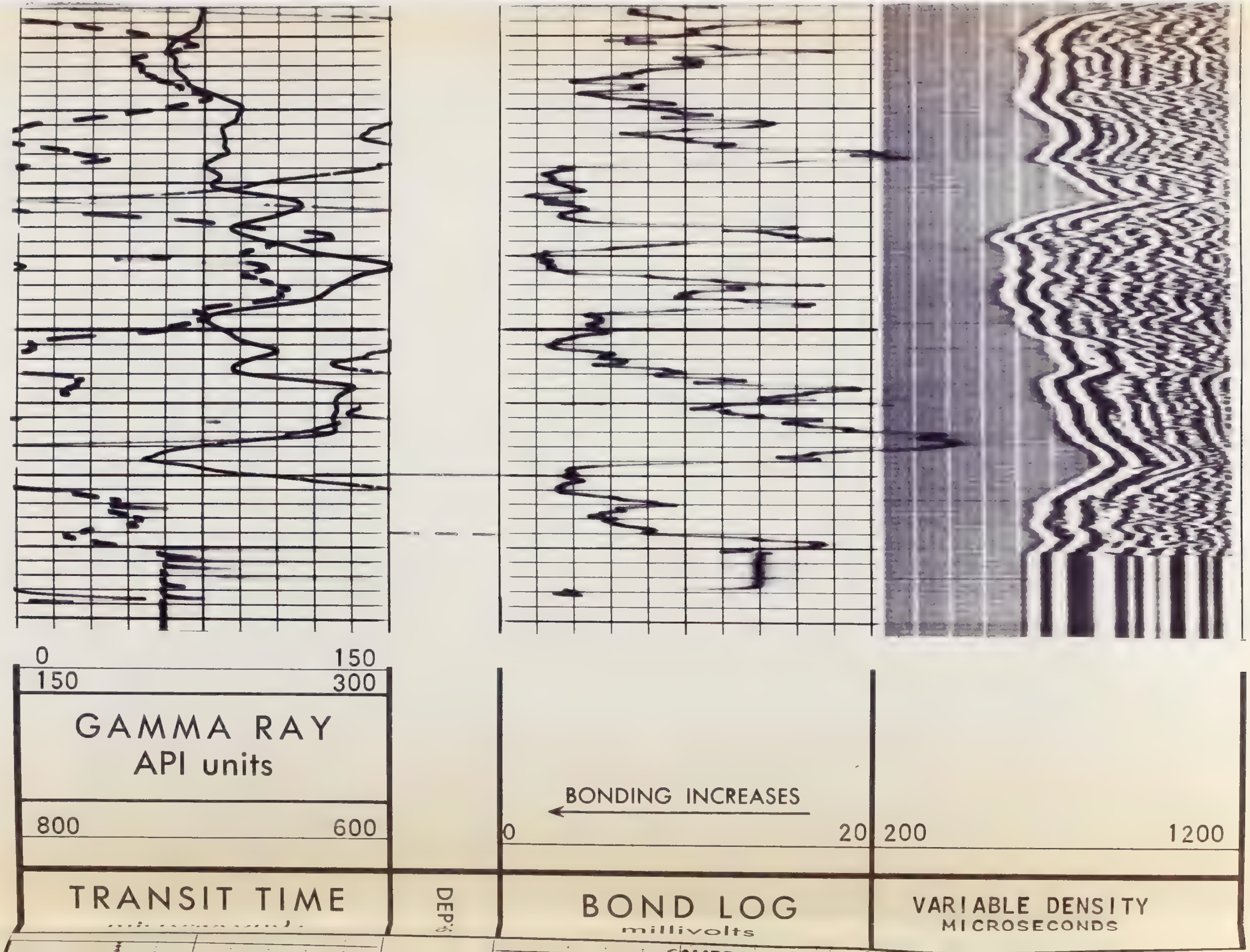

0800
0900

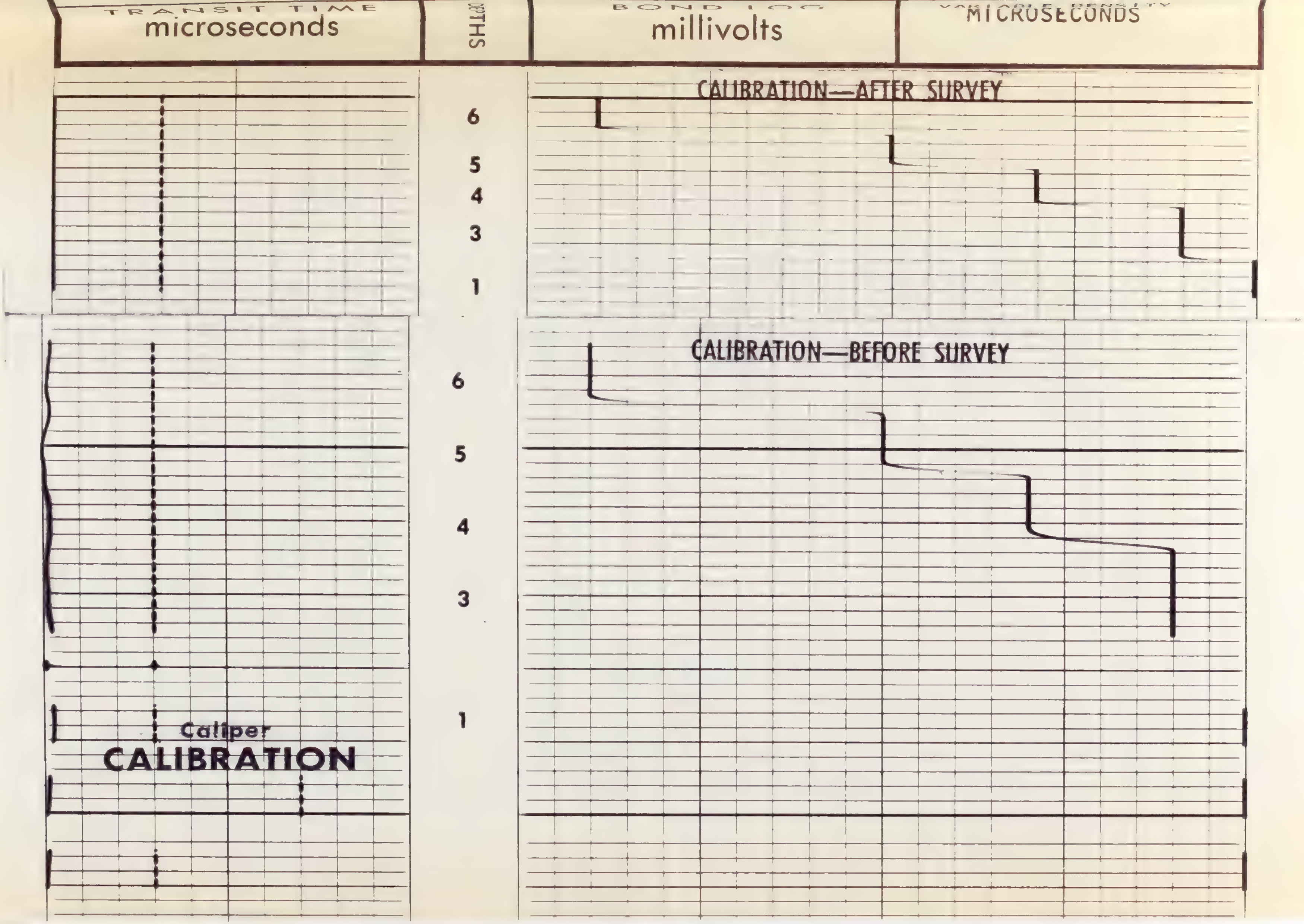


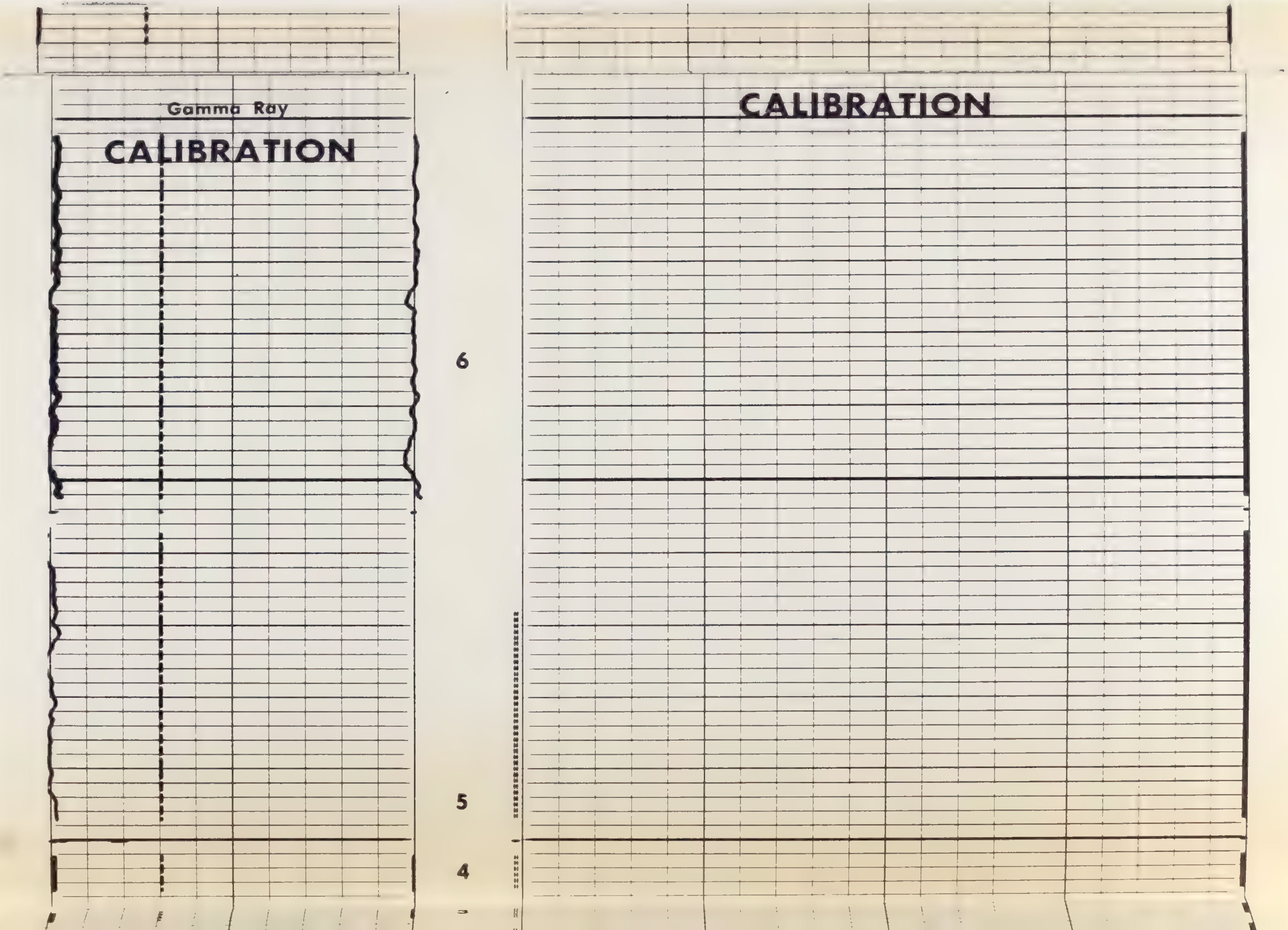
REPEAT SECTION

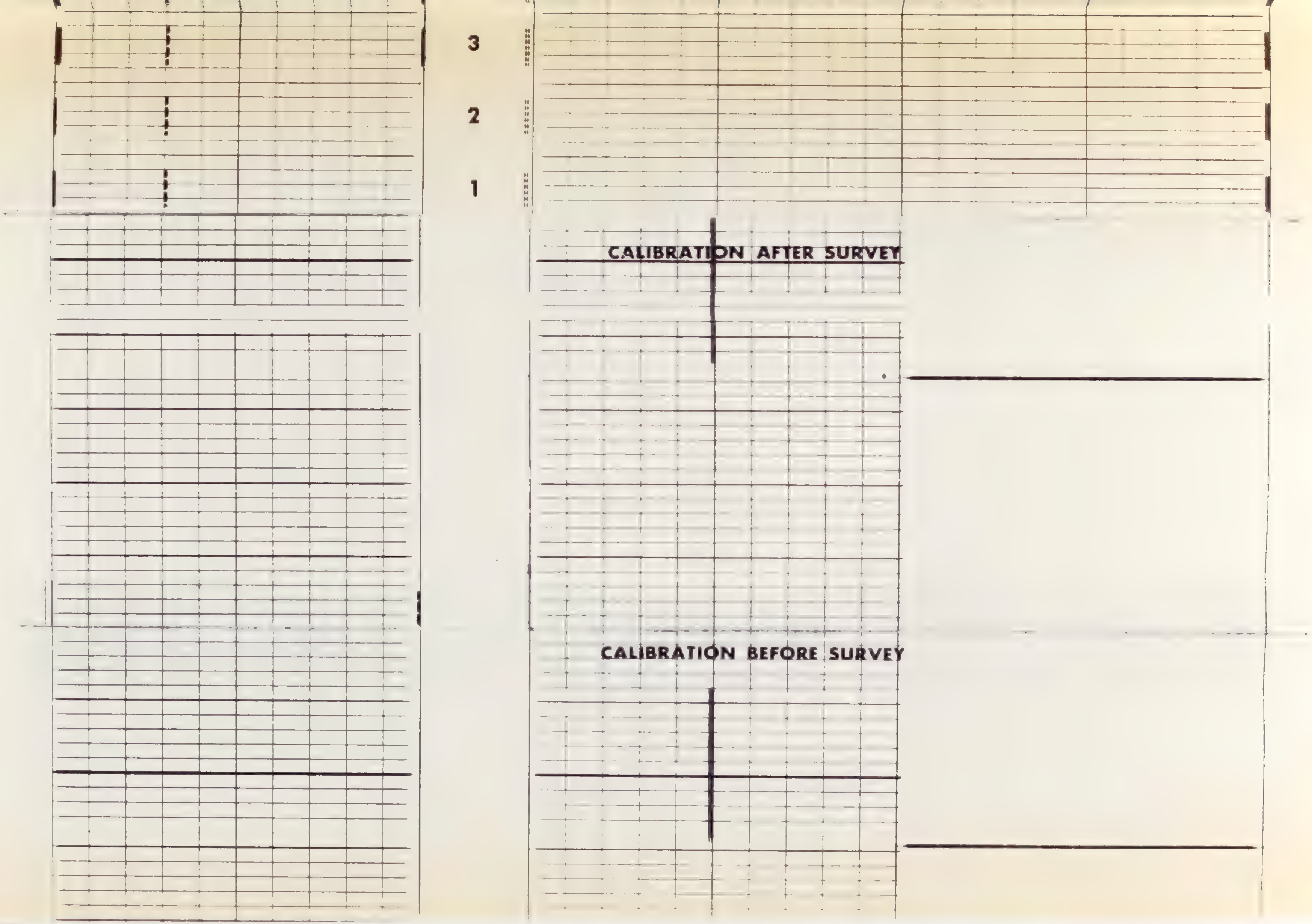

0700
MEMORIZER OUT — C


CURVES . INVALID
0800
0900


0
150
150
300
GAMMA RAY
API units
800
600
TRANSIT TIME
DEPTHS
BONDING INCREASES
0
20
BOND LOG
millivolts
200
1200
VARIABLE DENSITY
MICROSECONDS


TRANSIT TIME
microseconds
DEPTHS
BOND LOG
millivolts
VARIABLE DENSITY
MICROSECONDS
CALIBRATION—AFTER SURVEY
6
5
4
3
1
CALIBRATION—BEFORE SURVEY
6
5
4
3
1
Caliper
CALIBRATION


Gamma Ray
CALIBRATION
CALIBRATION
6
5
4
3


3
2
1
CALIBRATION AFTER SURVEY
CALIBRATION BEFORE SURVEY

BOREHOLE COMPENSATED SONIC CALIBRATION CODING

1. MECHANICAL ZERO
2. 40 μ SEC/FT
3. 60 μ SEC/FT
4. 80 μ SEC/FT
5. 100 μ SEC/FT
6. 140 μ SEC/FT

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY
4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATION

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 20

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

SCHL FR 979
SCHL TD 987
DRLR TD 986.5
Elev:
KB
DF
GL 6358

COUNTY RIO BLANCO STATE COLORADO GL 6358

Schlumberger

COMPENSATED
FORMATION DENSITY LO
Gamma-Gamma

COUNTY RIO BLANCO
FIELD or LOCATION SOREHUM GULCH
WELL SOREHUM GULCH #20
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SOREHUM GULCH NO. 20

FIELD SOREHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.
261' FSL & 1599' FEL

Sec. 31 Twp. 2S Rge. 96W

Other Services:
FDC-GR
BHC-GR
TEMP.

Permanent Datum: GL ; Elev.: 6358
Log Measured From KB , 0 Ft. Above Perm. Datum
Drilling Measured From KB

Elev.: K.B.
D.F.
G.L. 6358

Date	12-12-74			
Run No.	ONE			
Depth—Driller	986.5			
Depth—Logger	987			
Btm. Log Interval	986			
Top Log Interval	SURFACE			
Casing—Driller	7 @ 216	@	@	@
Casing—Logger	216			
Bit Size	6-1/4			
Type Fluid in Hole	WATER			
Fluid Level	FULL			
Dens. | Visc.	|	|	|	|
pH | Fluid Los	| ml	| ml	| ml	|
Source of Sample	PIT			
R_m @ Meas. Temp.	5.54 @ 45 °F	@ °F	@ °F	@
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: R_{mf} | R_{mc}	|	|	|	|
R_m @ BHT	3.72 @ 67 °F	@ °F	@ °F	@
Time Since Circ.	34-1/2 HRS.			
Max. Rec. Temp.	67 °F	°F	°F	
Equip. | Location	7699 | GJ	|	|	|
Recorded By	MOSS			
Witnessed By	BURNS			

SWS 1381-H

FOLD HERE — The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date / Sample No.				
Depth - Driller				
Type Fluid				
Source of Sample				
R_m @ Meas. Temp.	@ °F		@ °F	
R_{mf} @ Meas. Temp.	@ °F		@ °F	
R_{mc} @ Meas. Temp.	@ °F		@ °F	
R_m @ BHT	@ °F		@ °F	
Dens. / Visc.				
ph / Fluid Loss		ml		ml
% Water by Vol.				
% Oil by Vol.				
% Solids by Vol.				
Solids Av. Sp. Gr.				

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Panel No.	307			
Cart No.	242			
Skid No.	1104			
Sonde No.	207			
Source	2501			
Calibrator	263			
GR Cart.	475			
TTR				
Mem Panel	159			

LOGGING DATA

FDC Selectors

Liquid Density	Grain Density	Hole Fluid	Porosity Scale	From	To
1.00	2.65	LIQUID	NOT RUN		

REMARKS

Service Order No. - 94822

CIRCULATION STOPPED 12-11-74 @ 0245 TO
REAM & RUN DST'S

BIT SIZE CASING DATA

Bit	From	To	Csg. Size	Csg. Wt.	From	To
6 1/4	216	9865	7"		SURF	216

CALIBRATION DATA

Run No.	Gamma Ray			FDC — Before Log — ACPS		FDC — After Log — ACPS	
	API Scale	Background CPS	Total CPS	P_1	P_2	P_1	P_2
1	0-150	240	646	380	540	380	540
2							
3							
4							

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

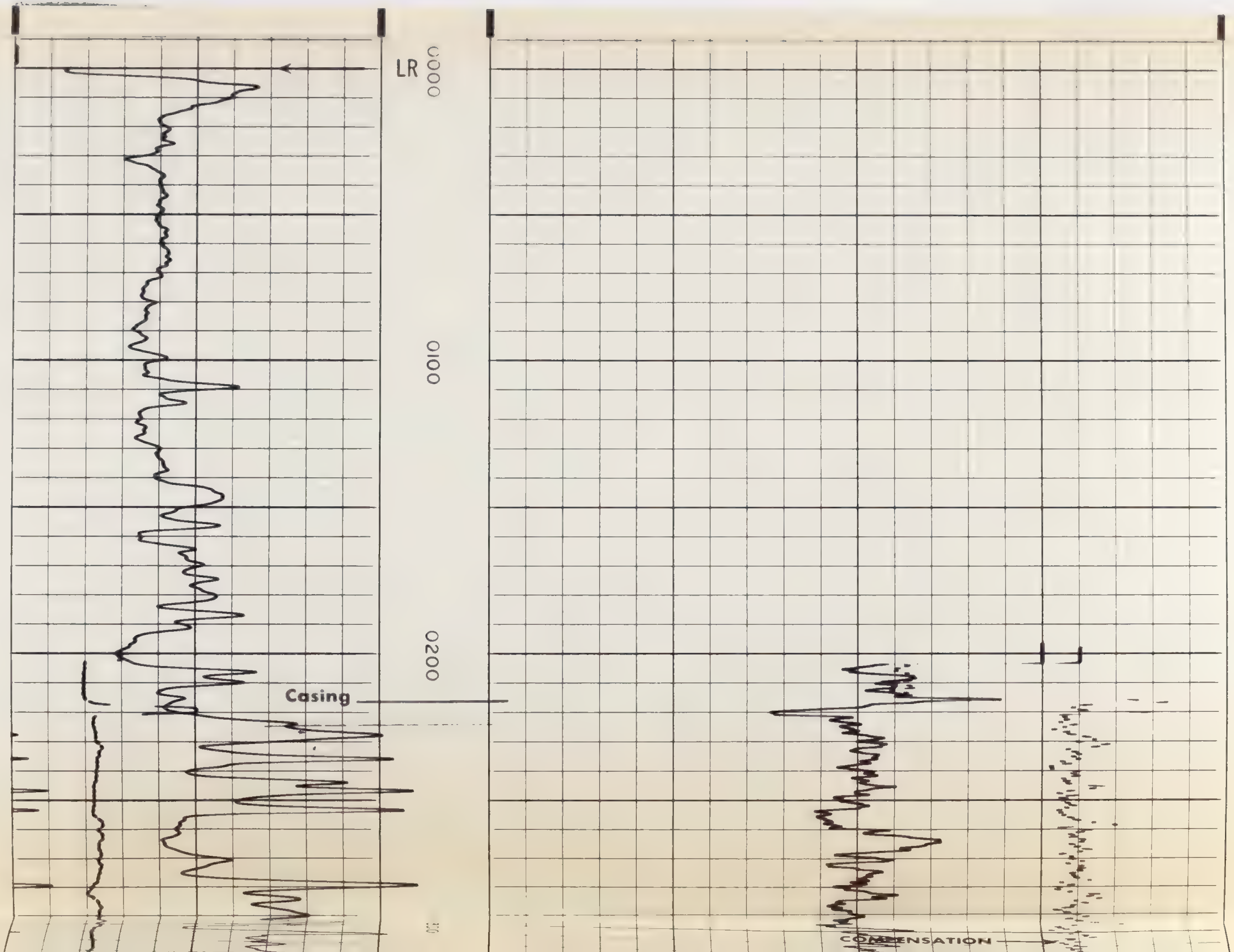
CALIPER
HOLE DIAM. IN INCHES
5 — 15

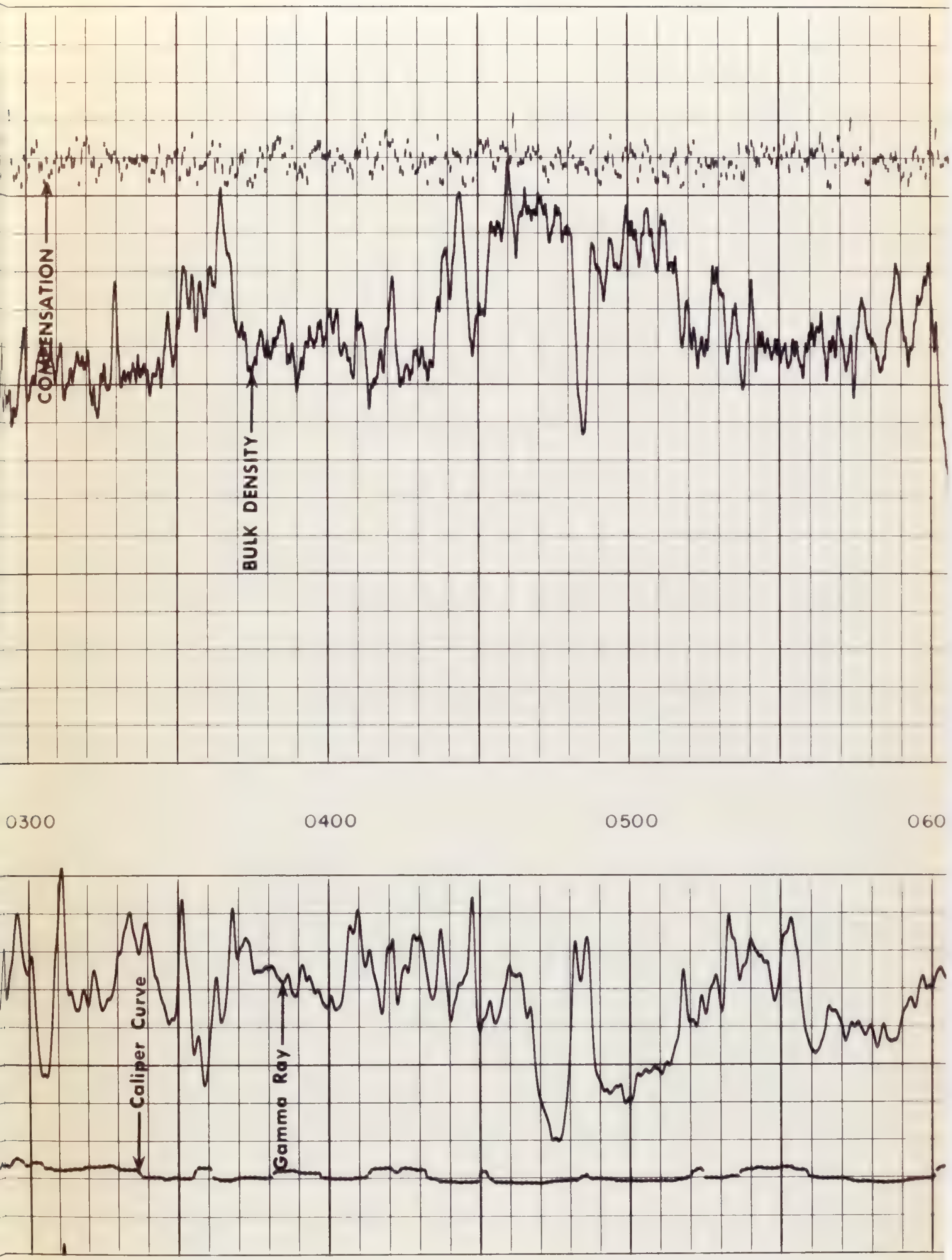
DEPTHS

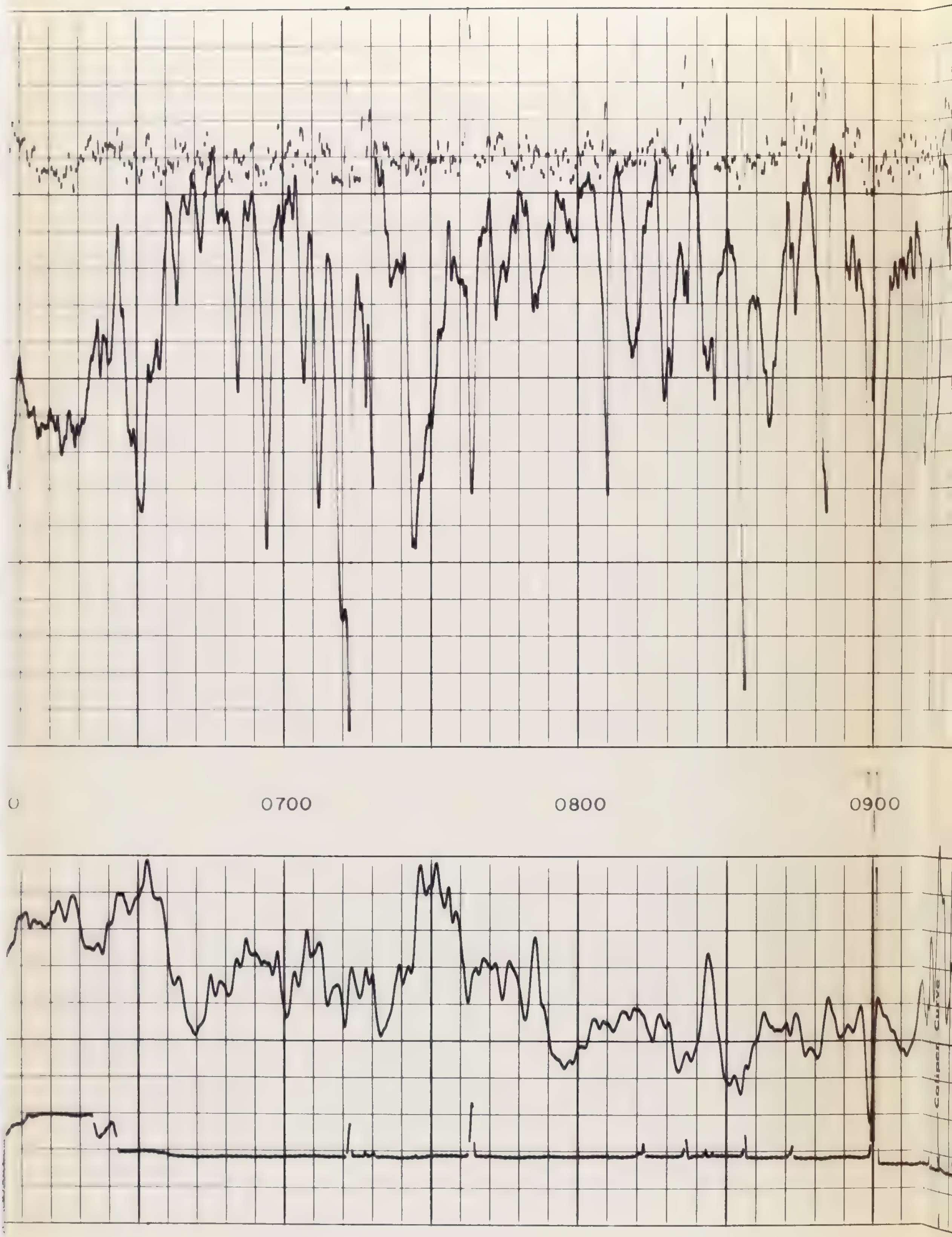
-.25 — 0 — .25
CORRECTION
GRAMS/CC.

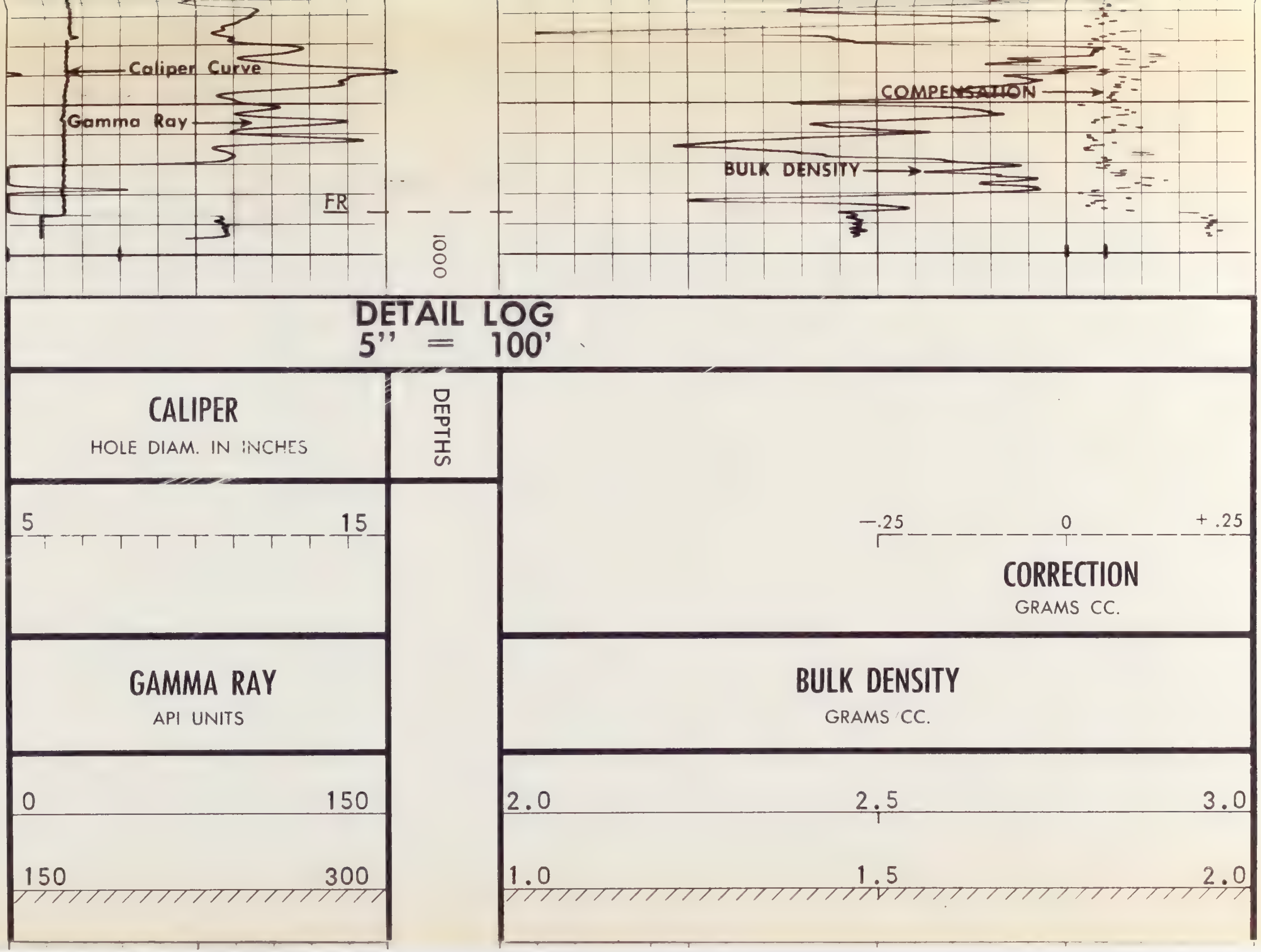
GAMMA RAY
API UNITS
0 — 150
150 — 300

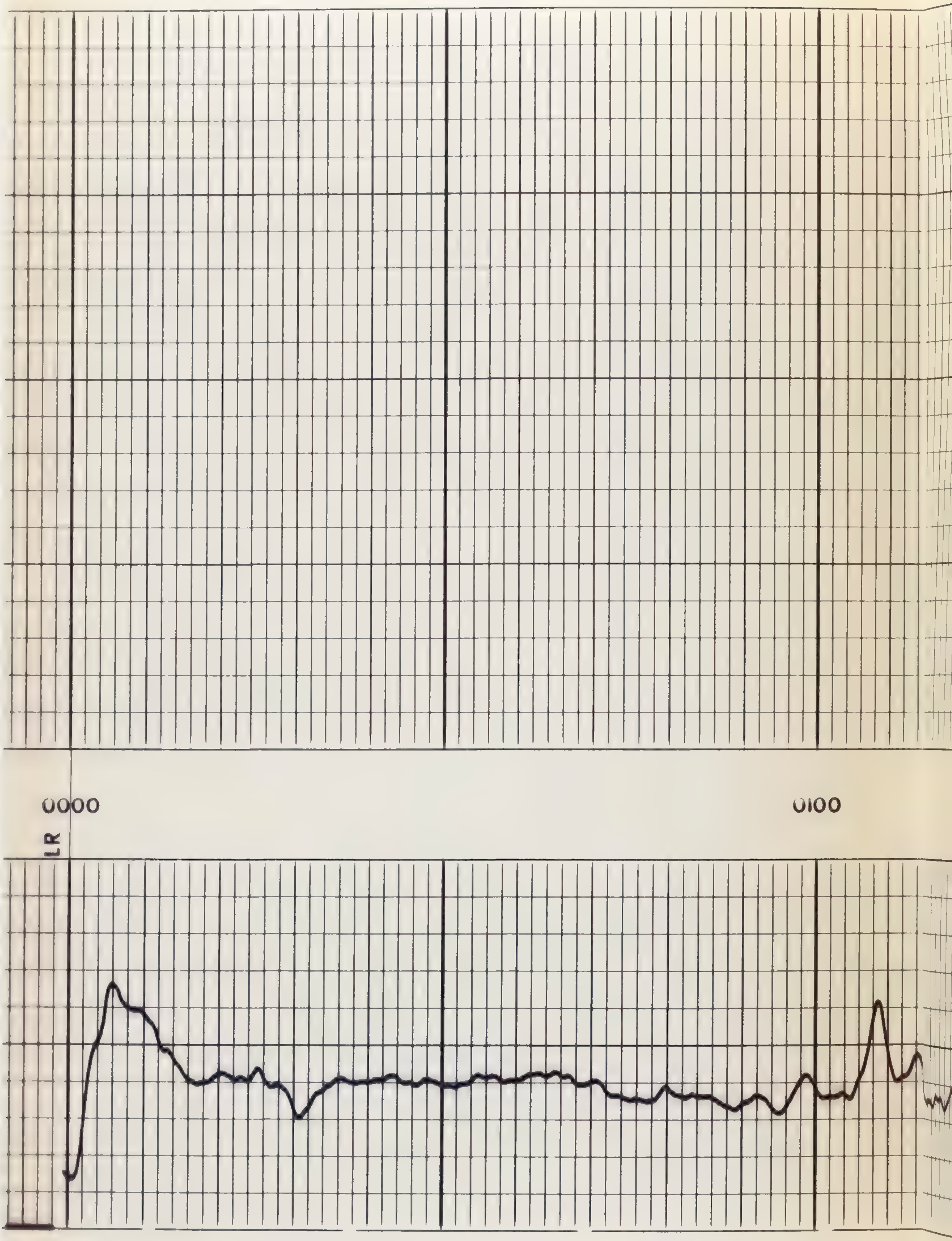
BULK DENSITY
GRAMS CC.
2.0 — 2.5 — 3.0
1.0 — 1.5 — 2.0

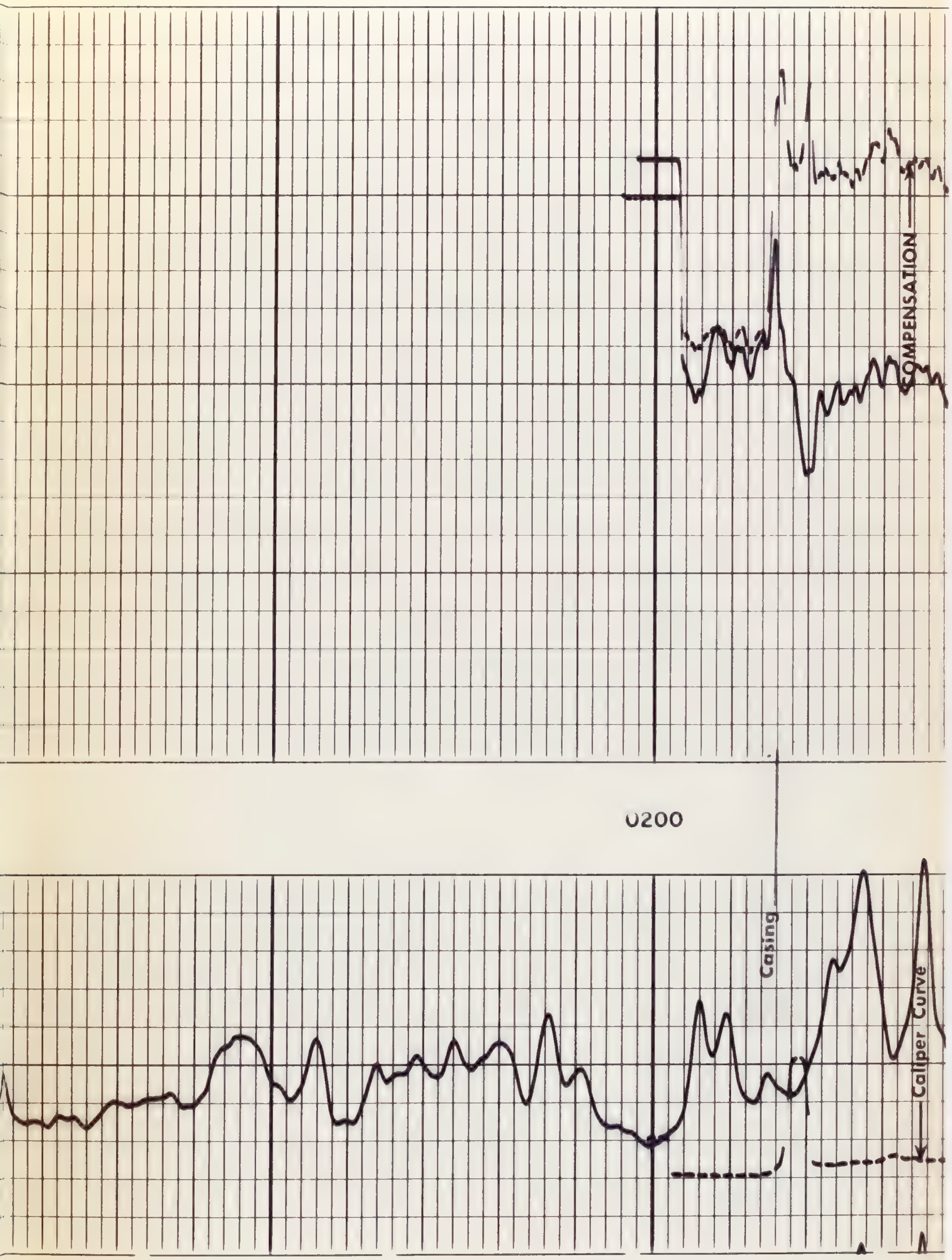

LR
0000
0100
0200
Casing
COMPENSATION

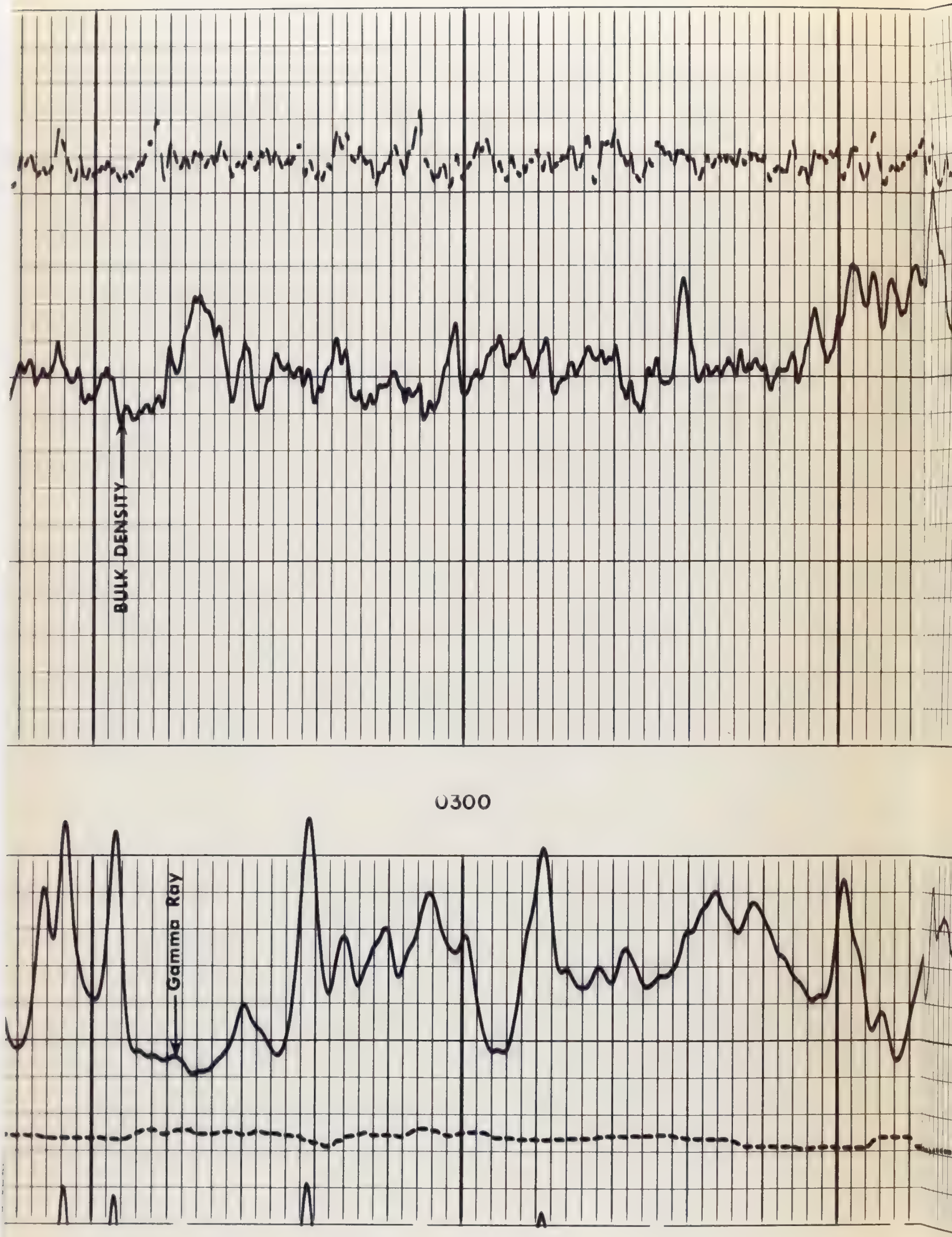

COMPENSATION
BULK DENSITY
0300
0400
0500
060
Caliper Curve
Gamma Ray

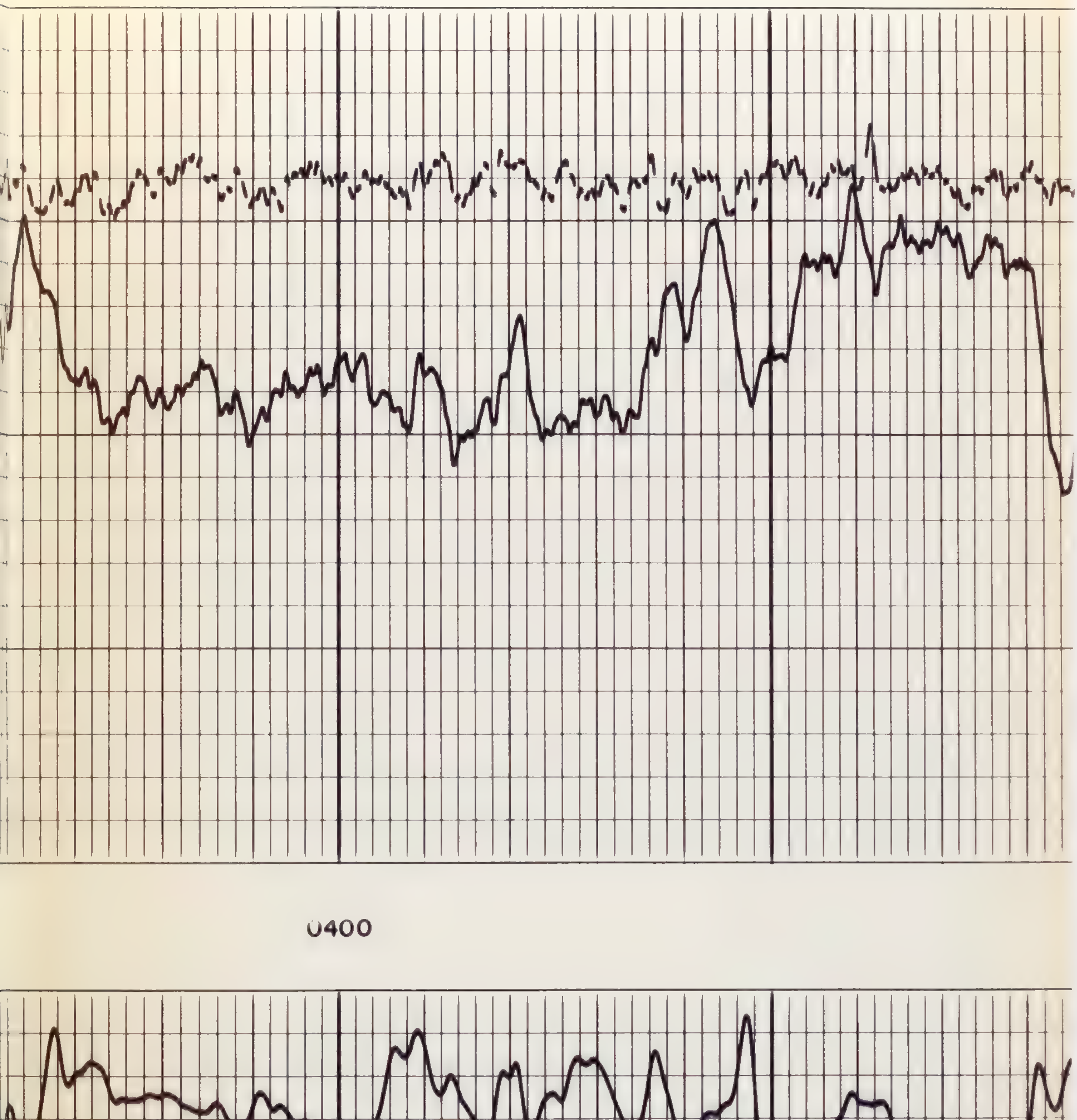

0
0700
0800
0900
Caliper Curve


Caliper Curve
Gamma Ray
COMPENSATION
BULK DENSITY
FR
1000
DETAIL LOG
5'' = 100'
CALIPER
HOLE DIAM. IN INCHES
5
15
DEPTHS
—.25
0
+ .25
CORRECTION
GRAMS CC.
GAMMA RAY
API UNITS
0
150
150
300
BULK DENSITY
GRAMS CC.
2.0
2.5
3.0
1.0
1.5
2.0

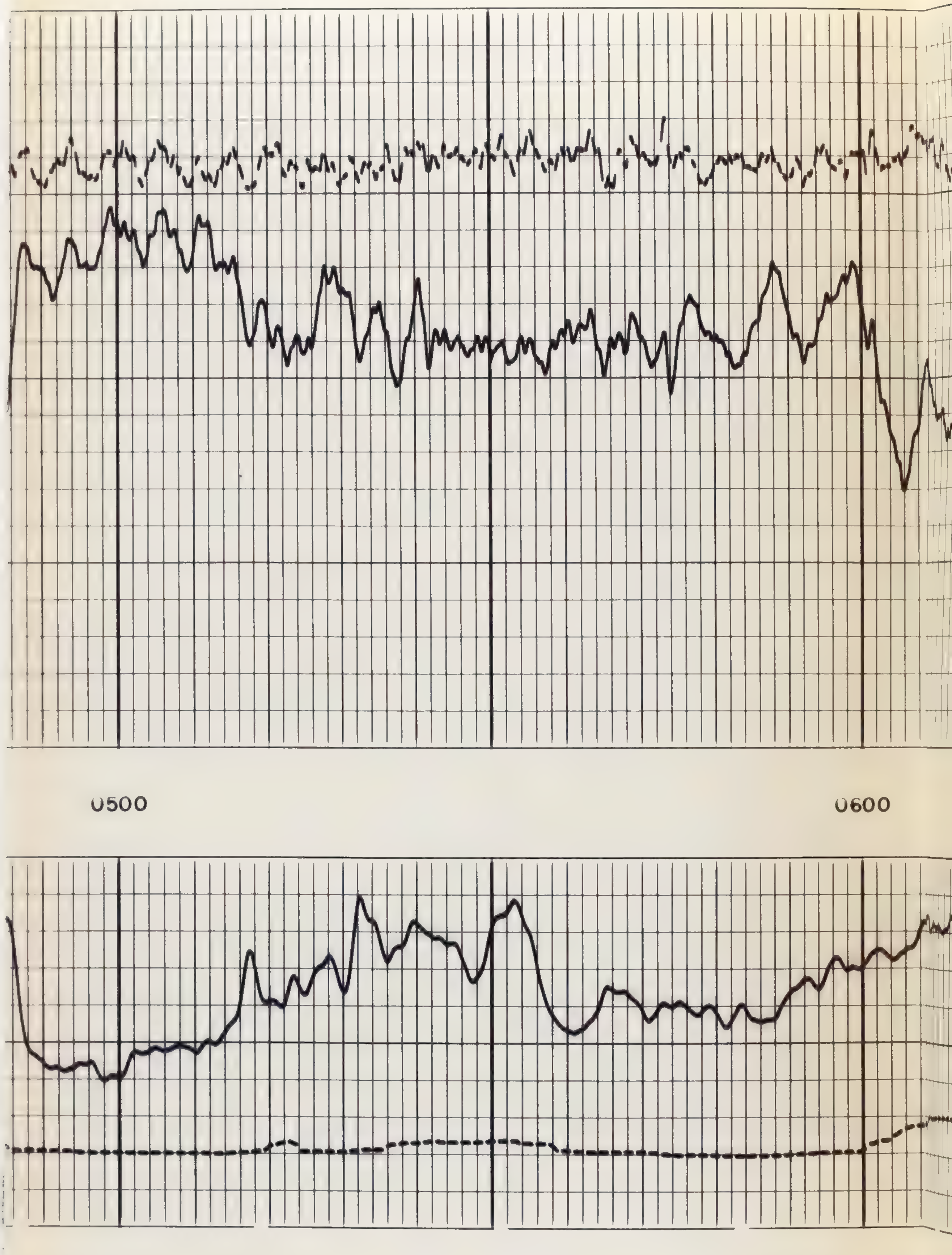

0000
LR
0100

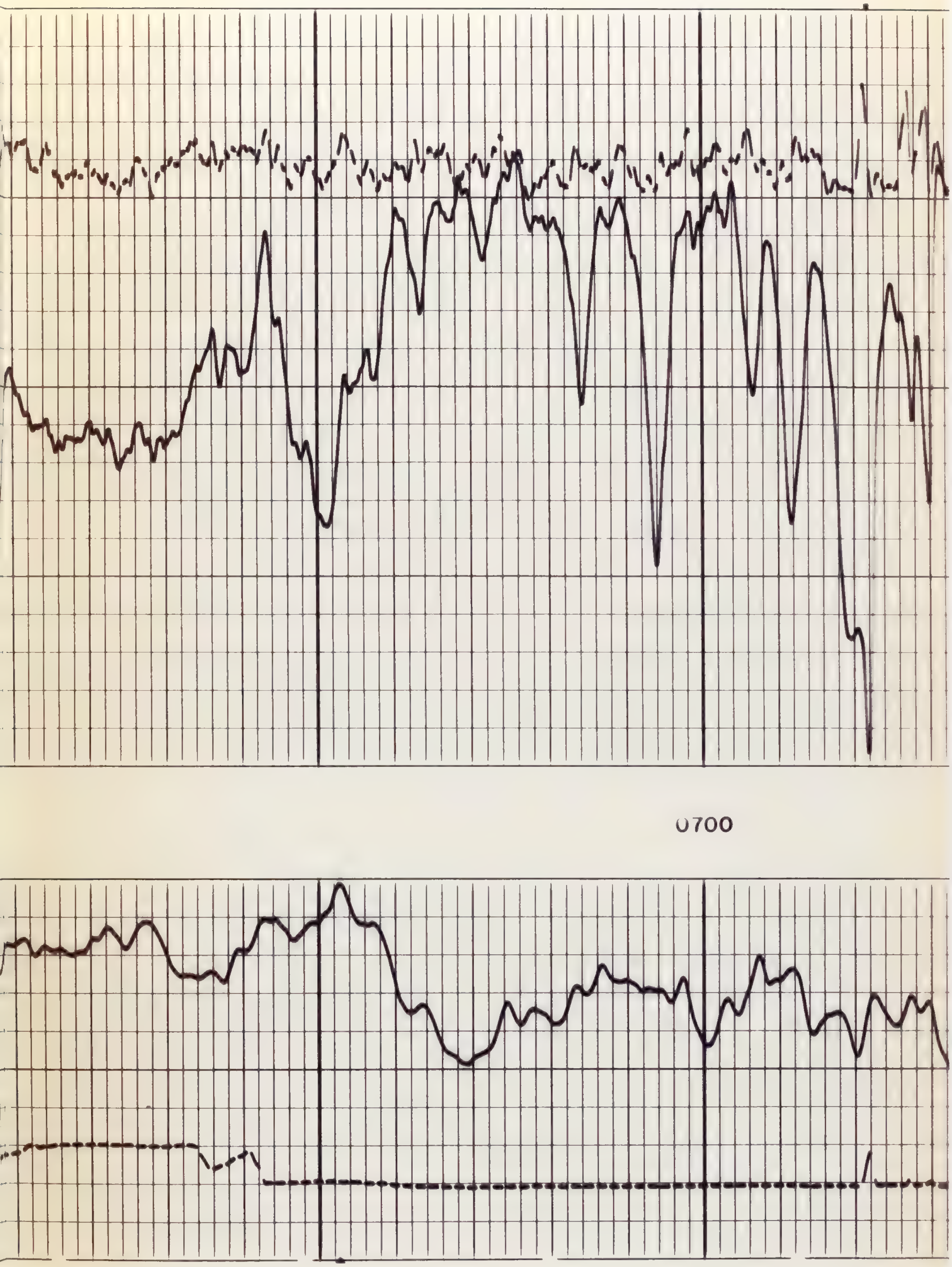

COMPENSATION
0200
Casing
Caliper Curve

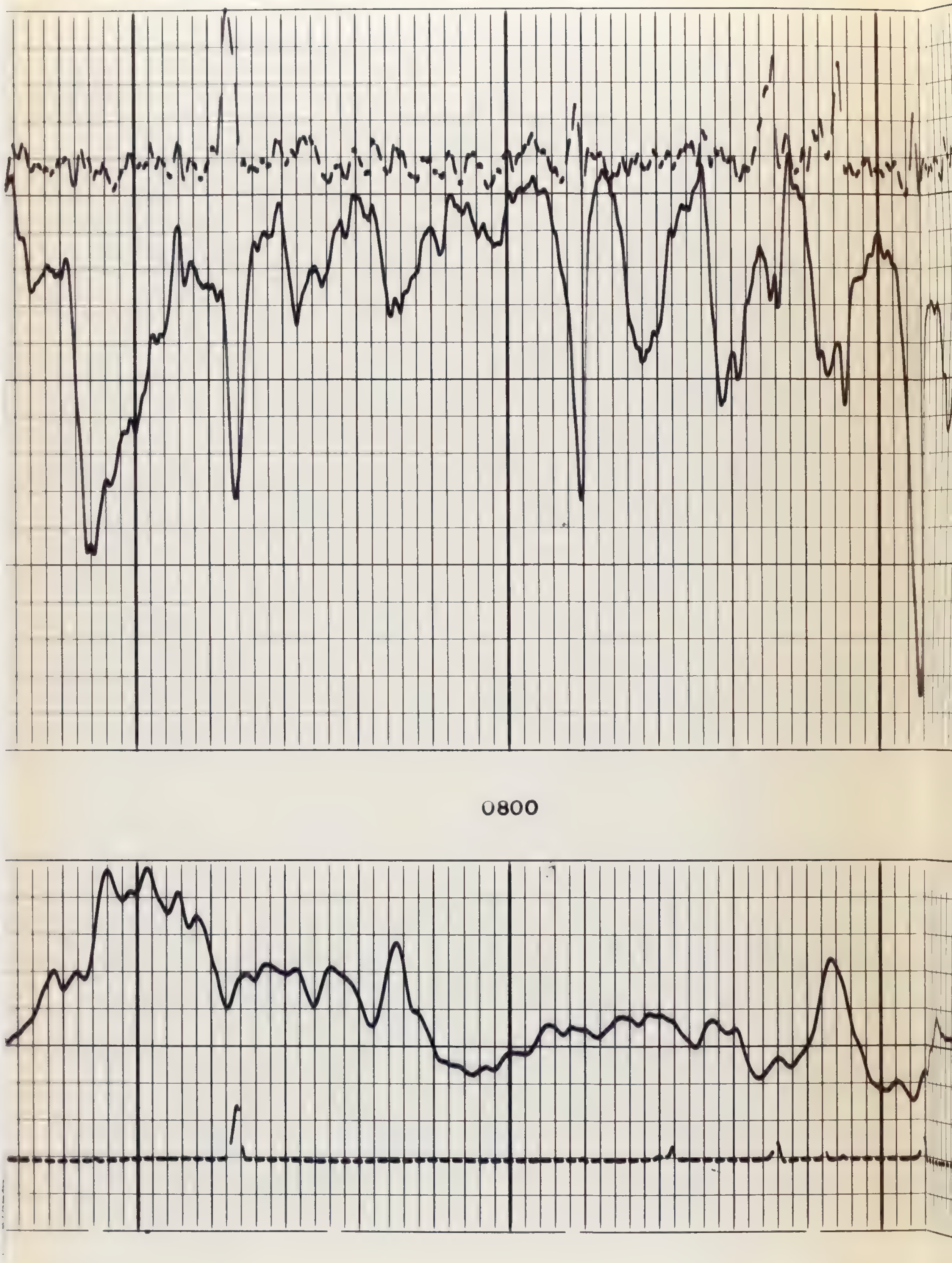

BULK DENSITY
0300
Gamma Ray

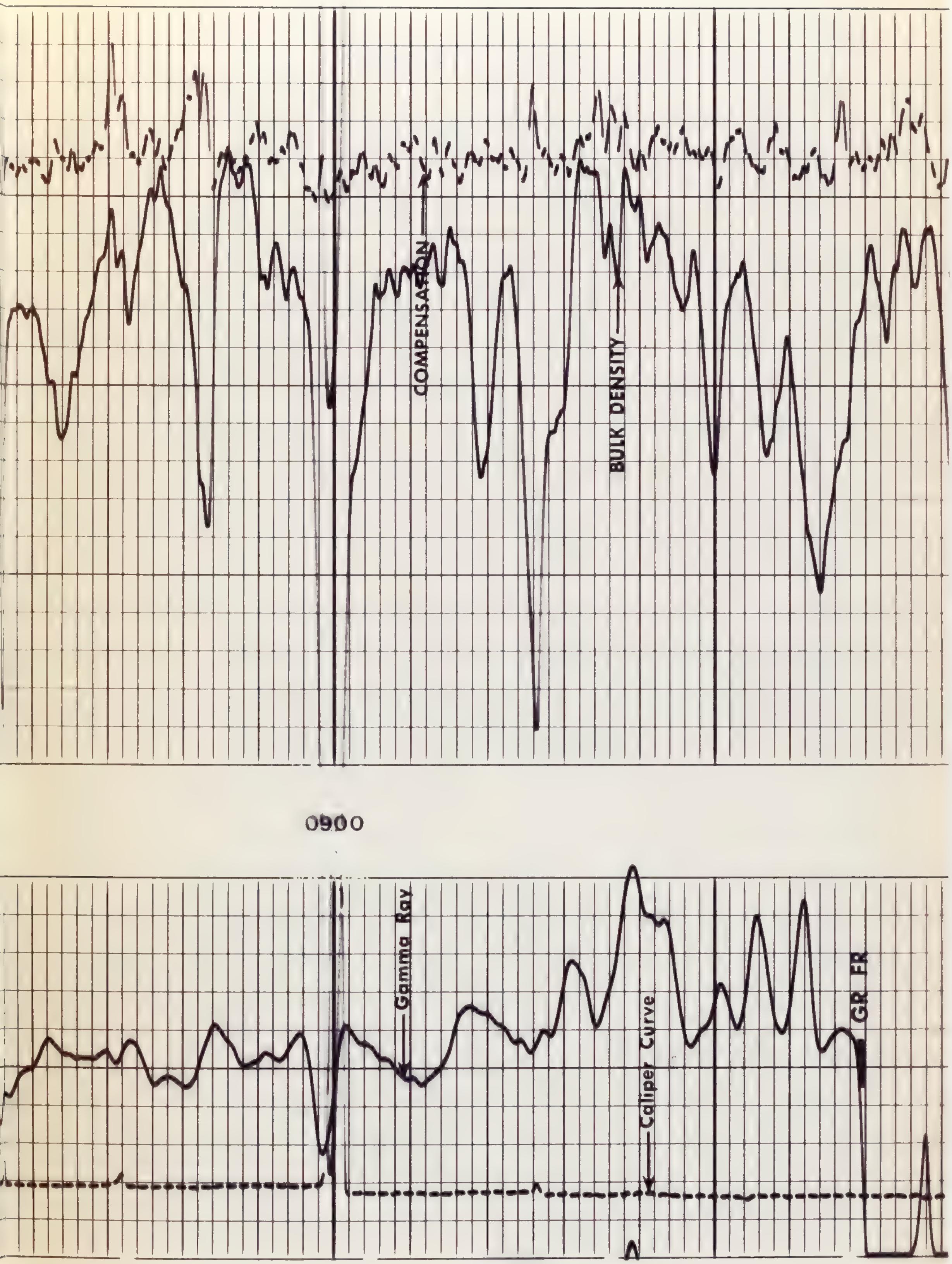


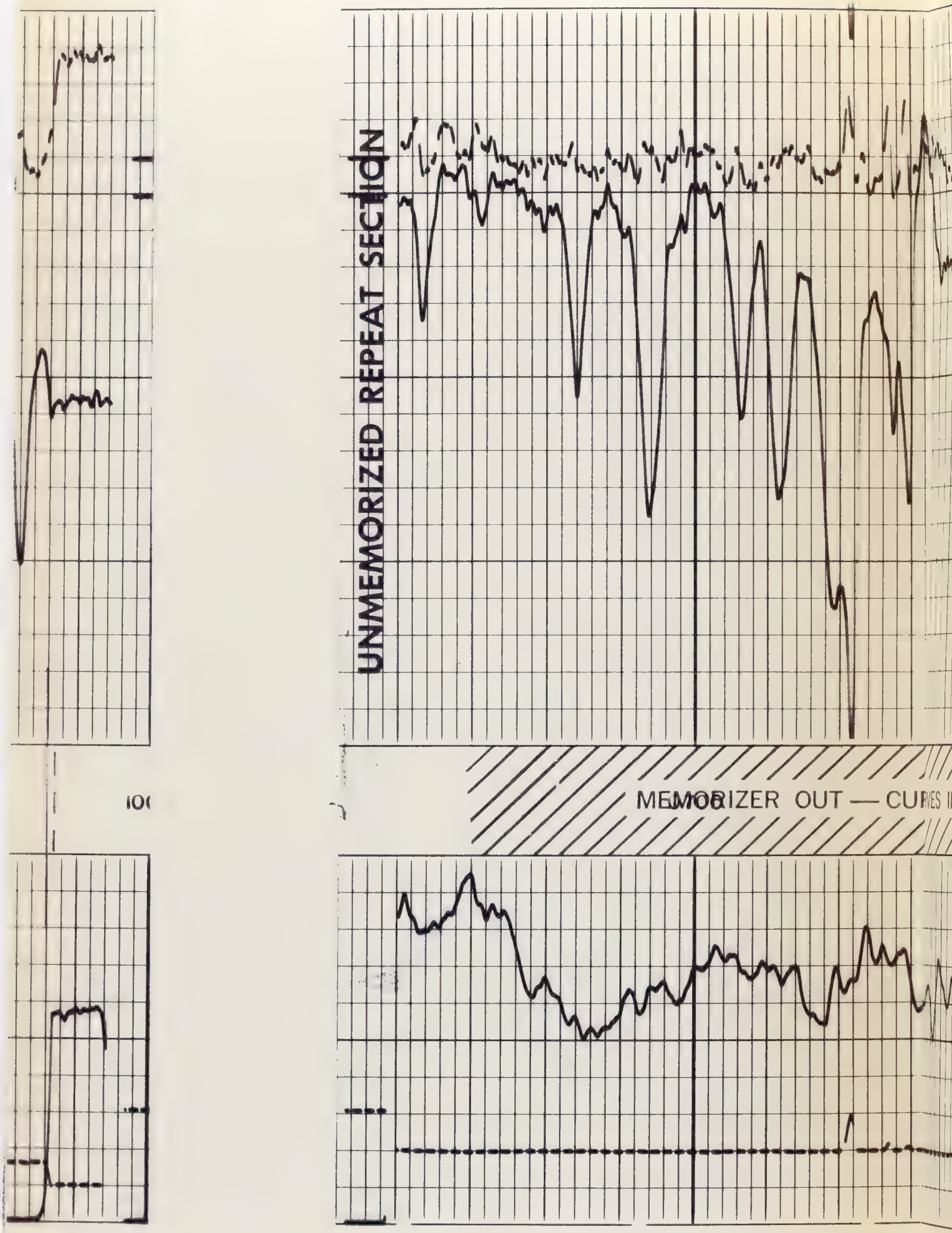
0400

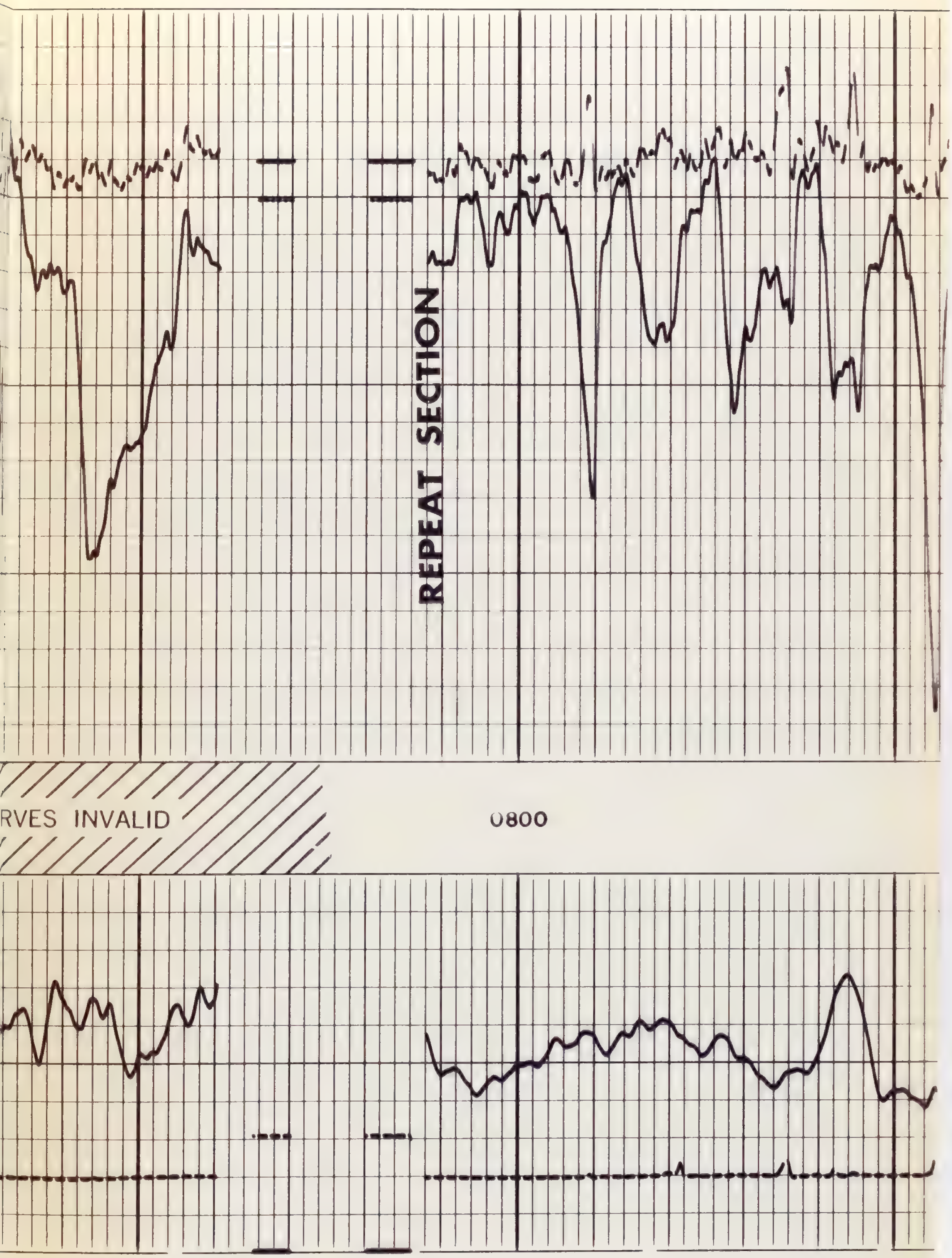

0500
0600

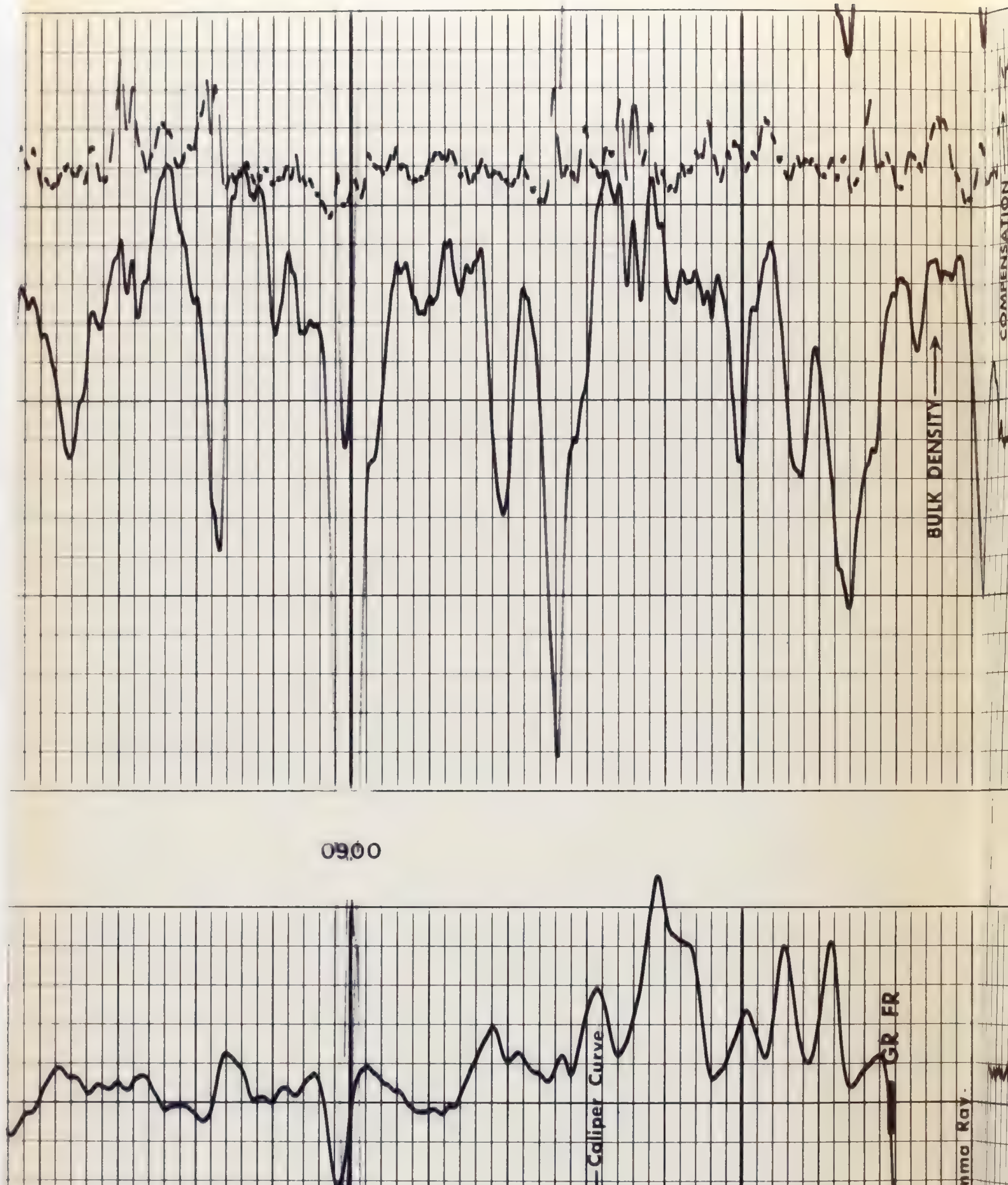

0700

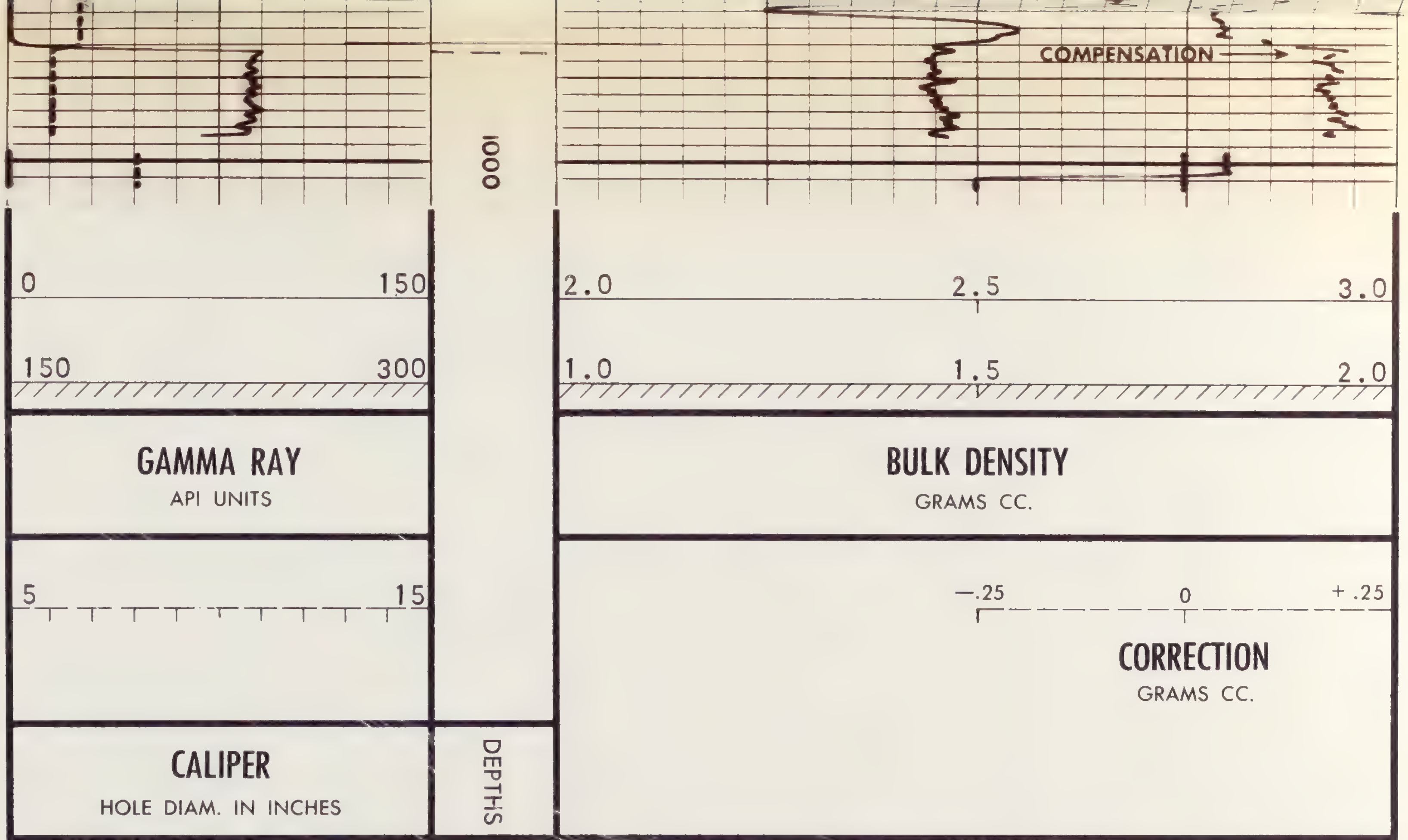

0800


COMPENSATION
BULK DENSITY
0900
Gamma Ray
Caliper Curve
GR FR


UNMEMORIZED REPEAT SECTION
MEMORIZER OUT — CURVES I
10


REPEAT SECTION
RVES INVALID
0800

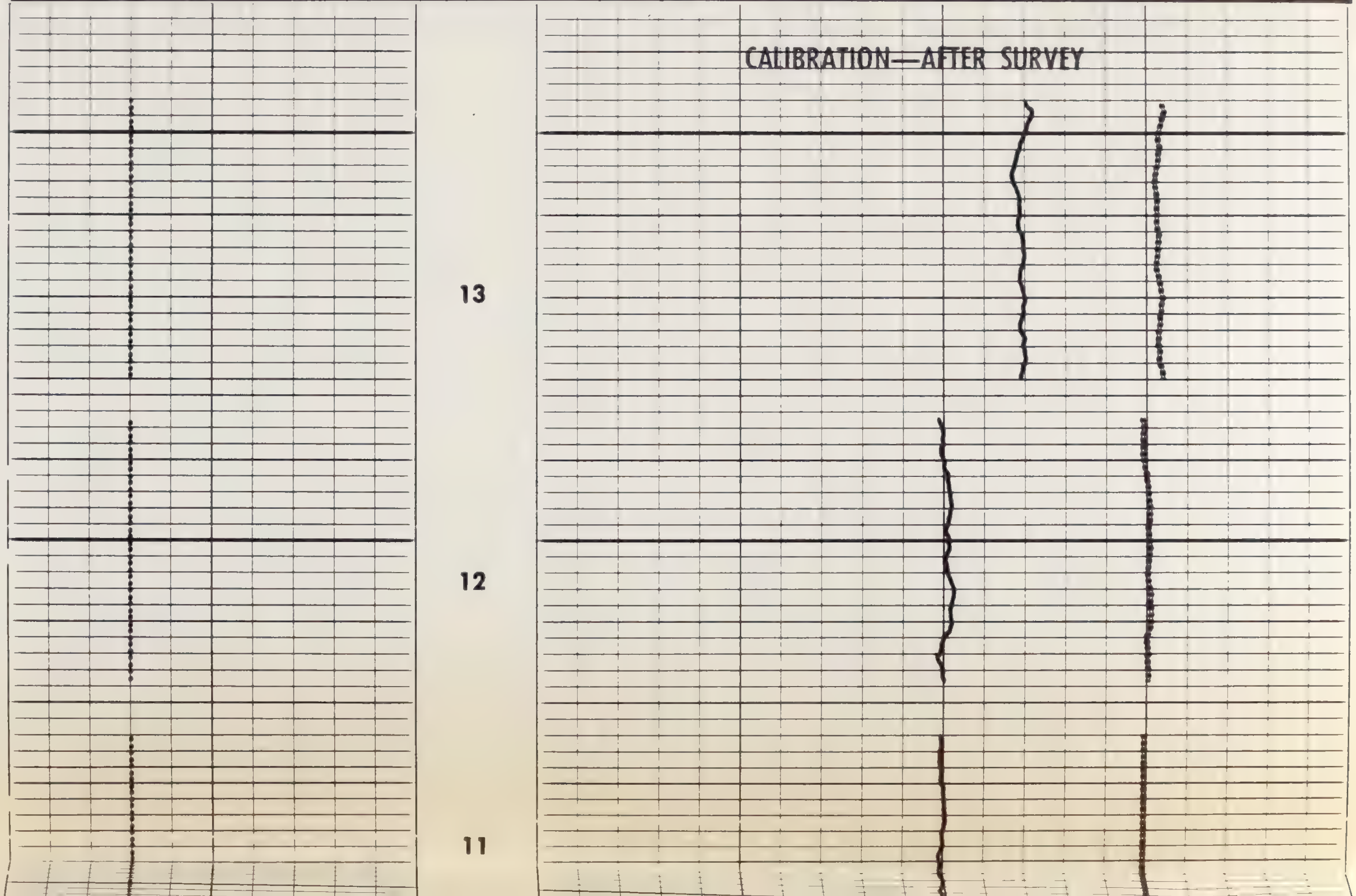

COMPENSATION
BULK DENSITY
0900
GR FR
Caliper Curve
Gamma Ray

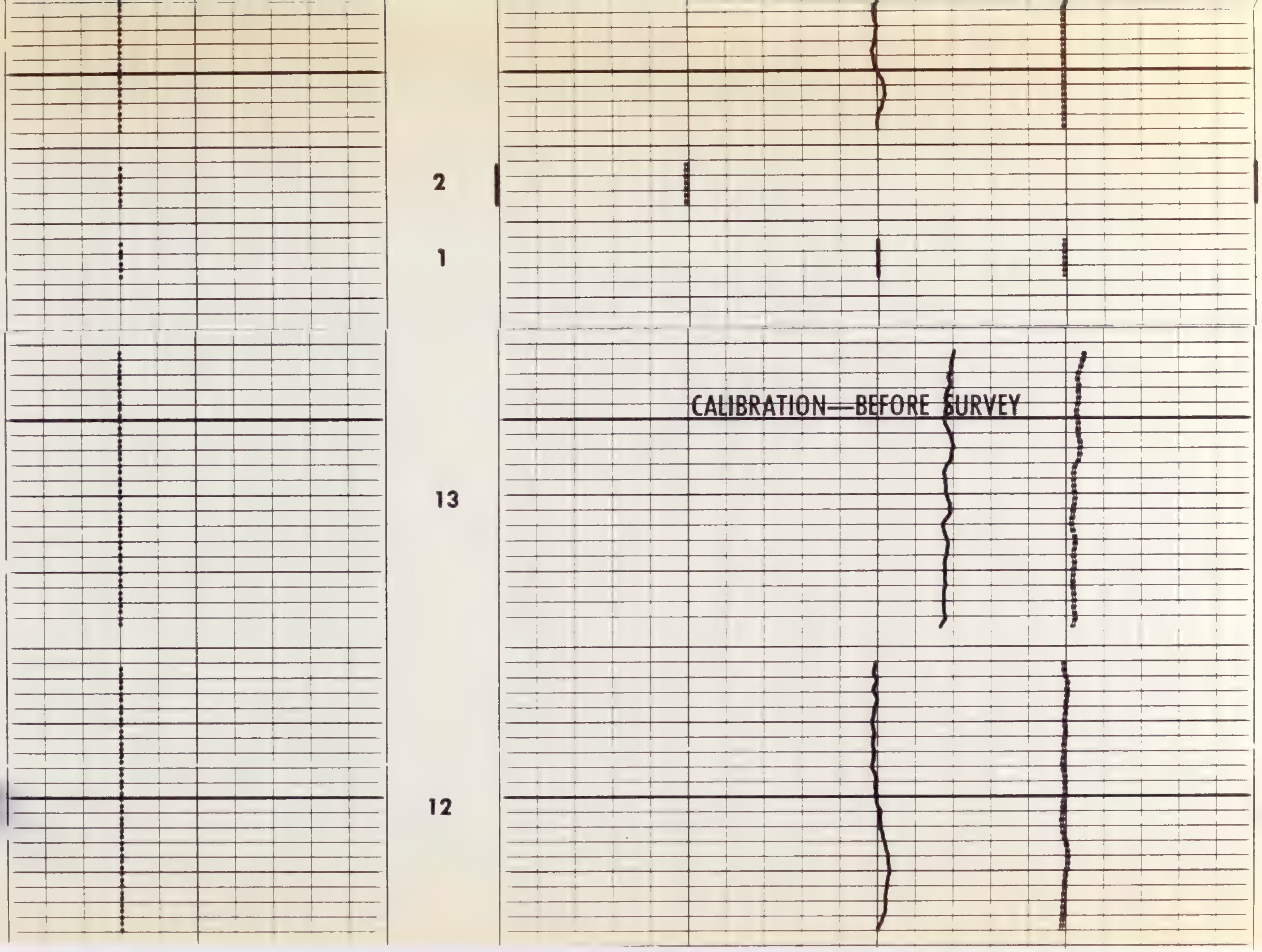


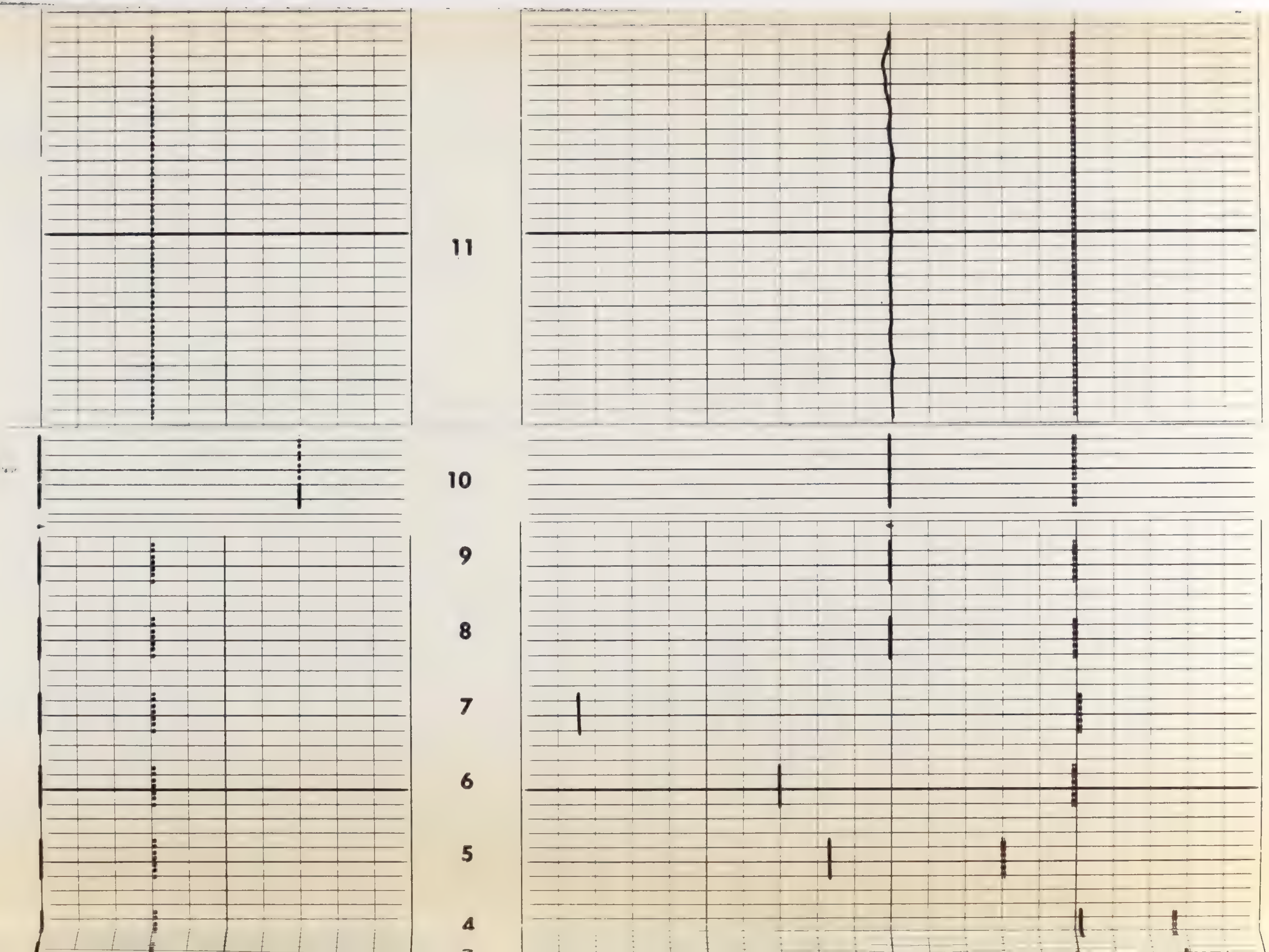
COMPANY ATLANTIC RICHFIELD COMPANY
WELL SOREHUM GULCH NO. 20
FIELD SOREHUM GULCH
COUNTY RIO BLANCO STATE COLORADO

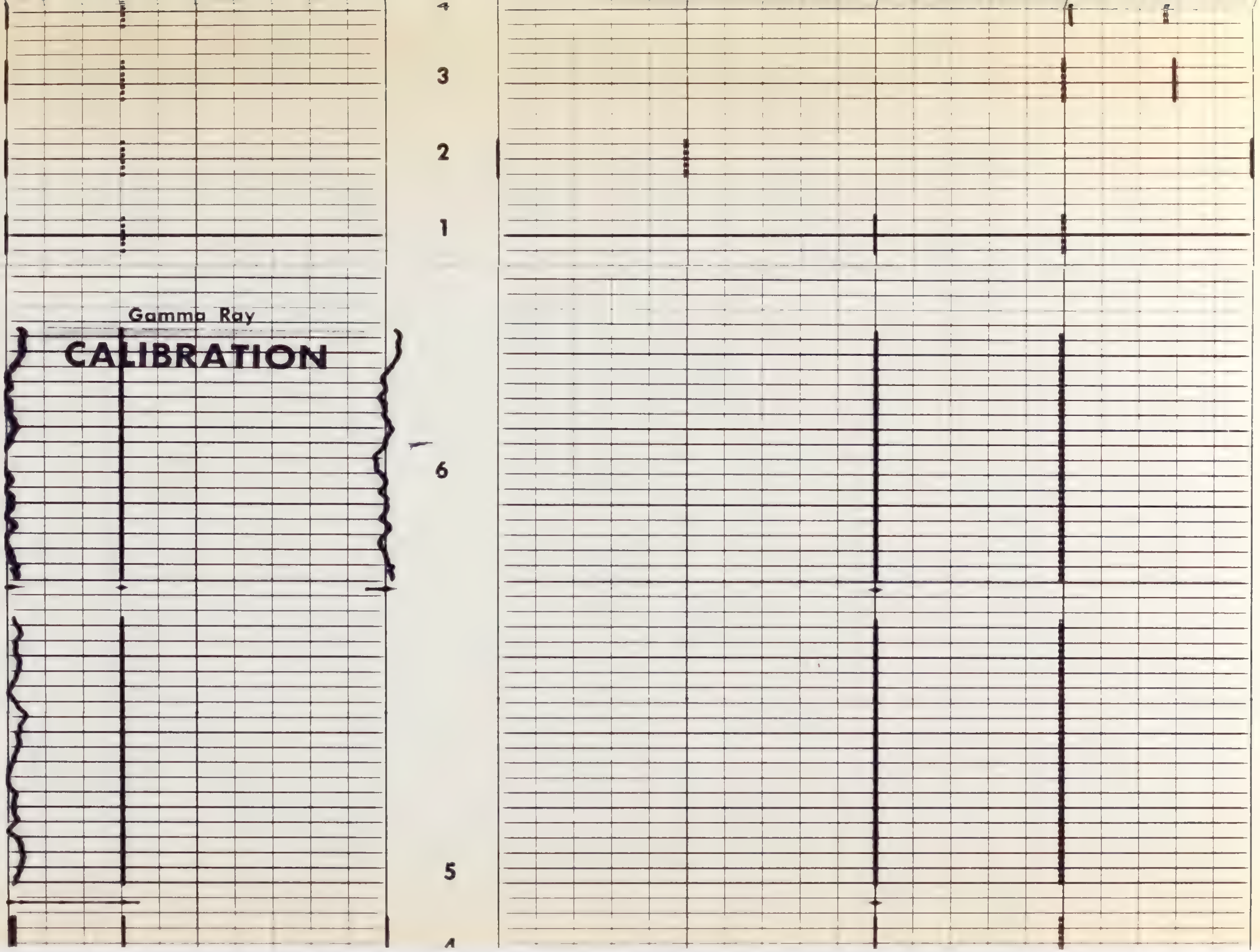
SCHL. FR 986
SCHL. TD 987
DRLR TD 986.5
Elev:
KB
DF
GL 6358

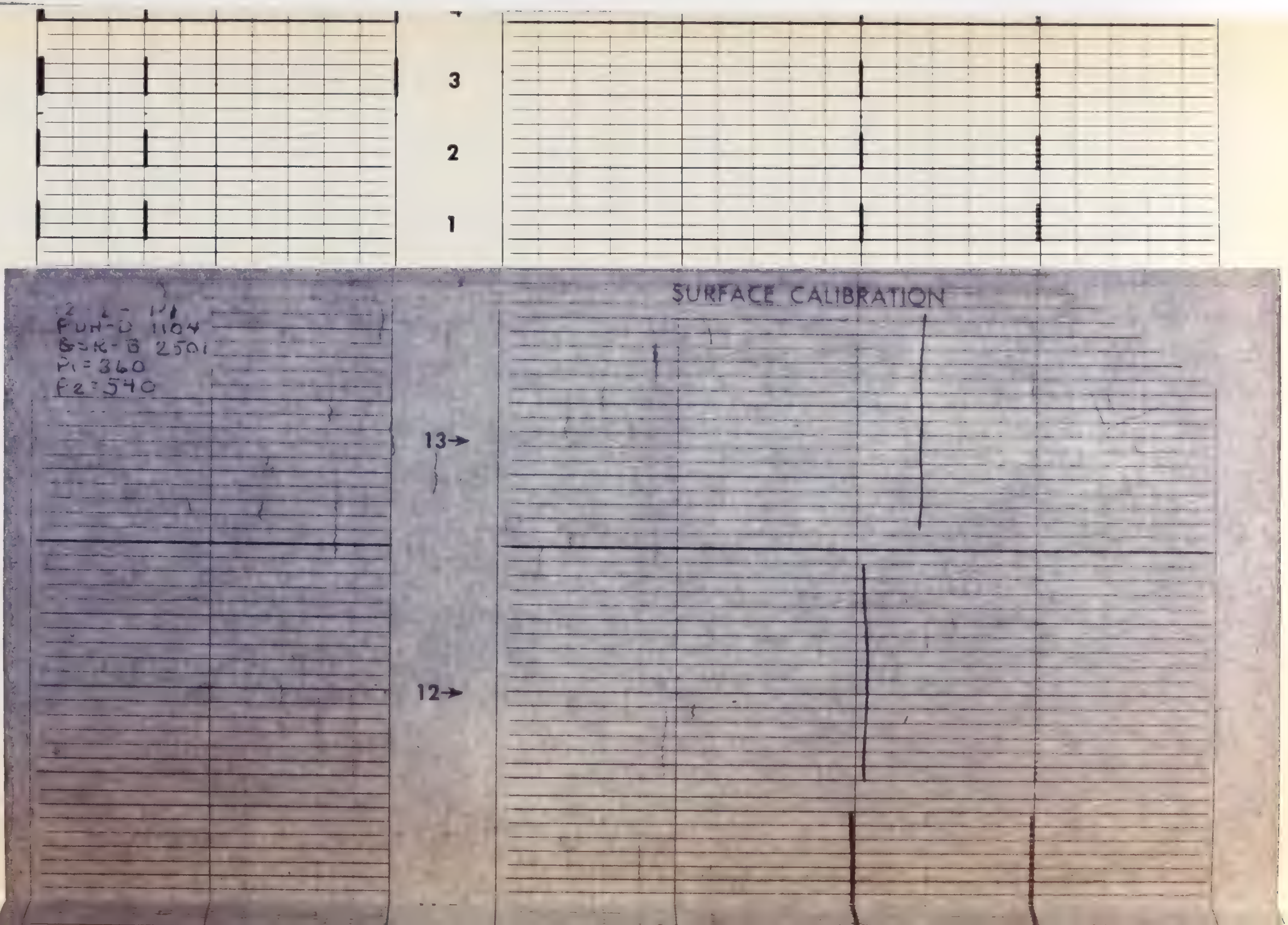
CALIBRATION RECORD

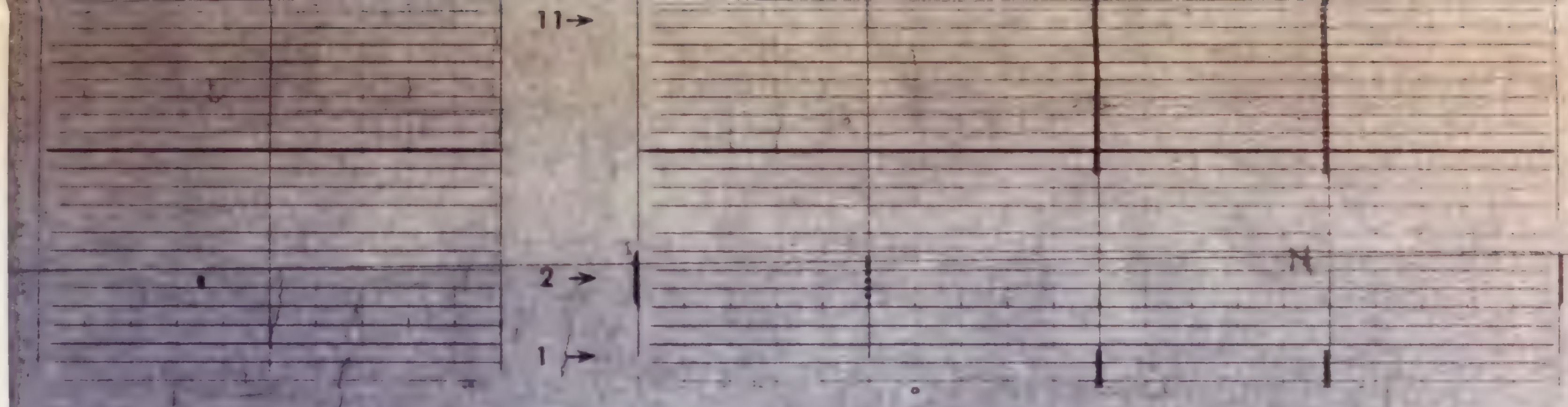



2
1
CALIBRATION—BEFORE SURVEY
13
12


11
10
9
8
7
6
5
4


4
3
2
1
Gamma Ray
CALIBRATION
6
5
4


3
2
1
SURFACE CALIBRATION
2 - 2 - 71
FUH-D 1104
B=K-B 2501
F1=360
F2=540
13→
12→



FORMATION DENSITY COMPENSATED CALIBRATION CODING

1. MECHANICAL ZERO
2. RECORDER SENSITIVITY

PANEL TEST

FDC LIQUID

	POS	ρ	$\Delta\rho$
3.	# 1	2.92	.00
4.	# 2	2.78	+.14
5.	# 3	2.42	-.10
6.	# 4	2.35	.00
7.	# 5	2.08	.01

8. MECHANICAL ZERO CALIPER
9. 8" RING
10. 12" RING
11. TOOL CALIBRATE # 1 SET ρ 2.50
12. TOOL CALIBRATE # 2 SET $\Delta\rho$ .00
13. LOG POSITION ρ = 2.59, $\Delta\rho$ = .015

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY

4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATE - SOURCE IN PLACE

CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY
WELL SOREHUM GULCH NO. 20
FIELD SOREHUM GULCH
COUNTY RIO BLANCO STATE COLORADO

SCHL. FR 986
SCHL. TD 987
DRLR TD 986.5
Elev:
KB
DF
GL 6358

Schlumberger

TEMPERATURE LOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL SORGHUM GULCH #20
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 20

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION
261' FSL & 1599' FEL

Sec. 31 Twp. 2S Rge. 96W

Other Services
FDC-GR
BHC-GR

Permanent Datum: GL ; Elev.: 6358
Log Measured From KB , 0 Ft. Above Perm. Datum
Drilling Measured From KB

Elev.: K.B.
D.F.
G.L. 635

Date	12-12-74		
Run No.	ONE		
Depth—Driller	986.5		
Depth—Logger	987		
Btm. Log Interval	986		
Top Log Interval			
Casing—Driller	7 @ 216	@	@
Casing—Logger	216		
Casing Size 1	7 To 216	To	To
2	To	To	To
Casing Weight 1			
2			
Casing Thickness 1			
2			
Bit Size 1	9 To 220	To	To
2	6' 4 To 982	To	To
Type Fluid in Hole	WATER		
Dens. Visc.			
Time Since Circ.	33 HOURS		
BHT	670		
Equip. Location	7699 GJ		
Recorded By	MOSS		
Witnessed By	BURNS		

SWS-368-C

FOLD HERE

The well name, location and borehole reference data were furnished by the customer.

REMARKS: EQUIPMENT: HTU-B 730A
PPU-A 777K
PAH-B 807
HTS-B 787
SERVICE ORDER NO. 94822

CEMENTATION DATA

Date	Depth	Type of Cement	Nb of Sacks	Additives	Calculated Top

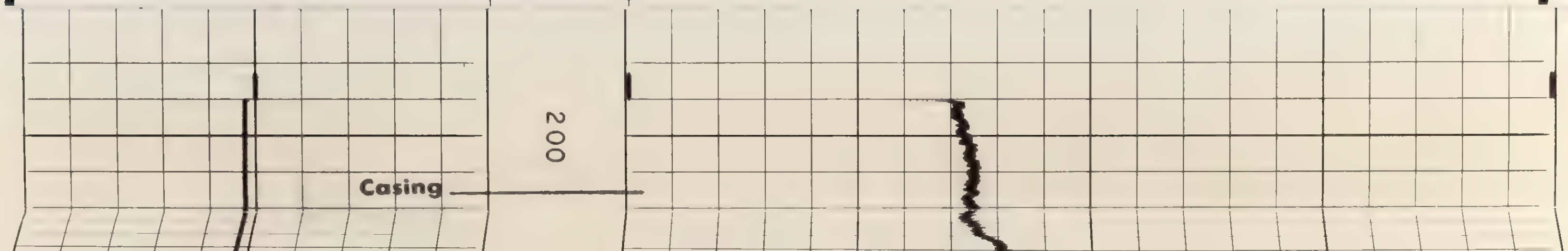
REDUCED SENSITIVITY TEMPERATURE

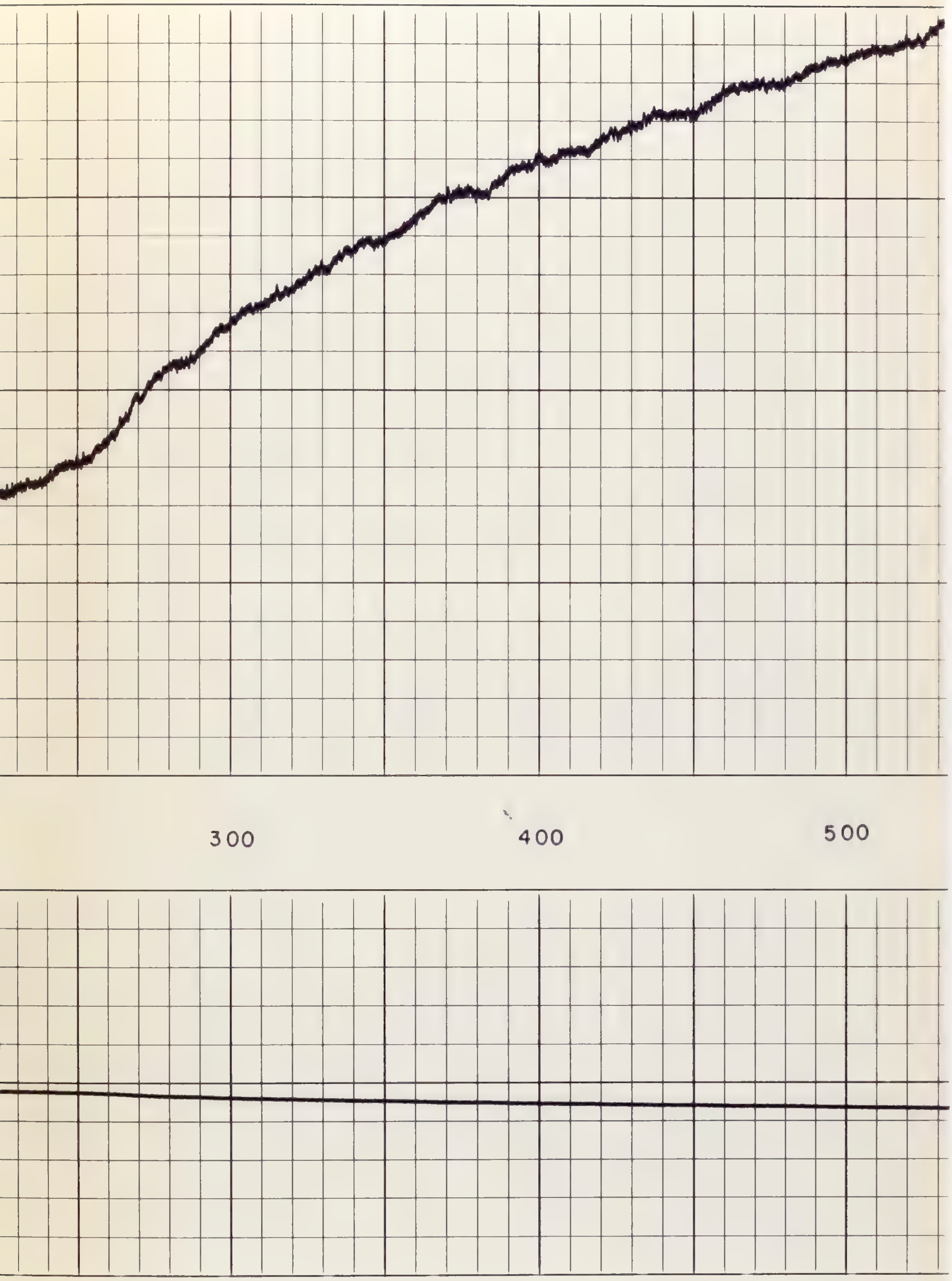
TEMPERATURE °F.

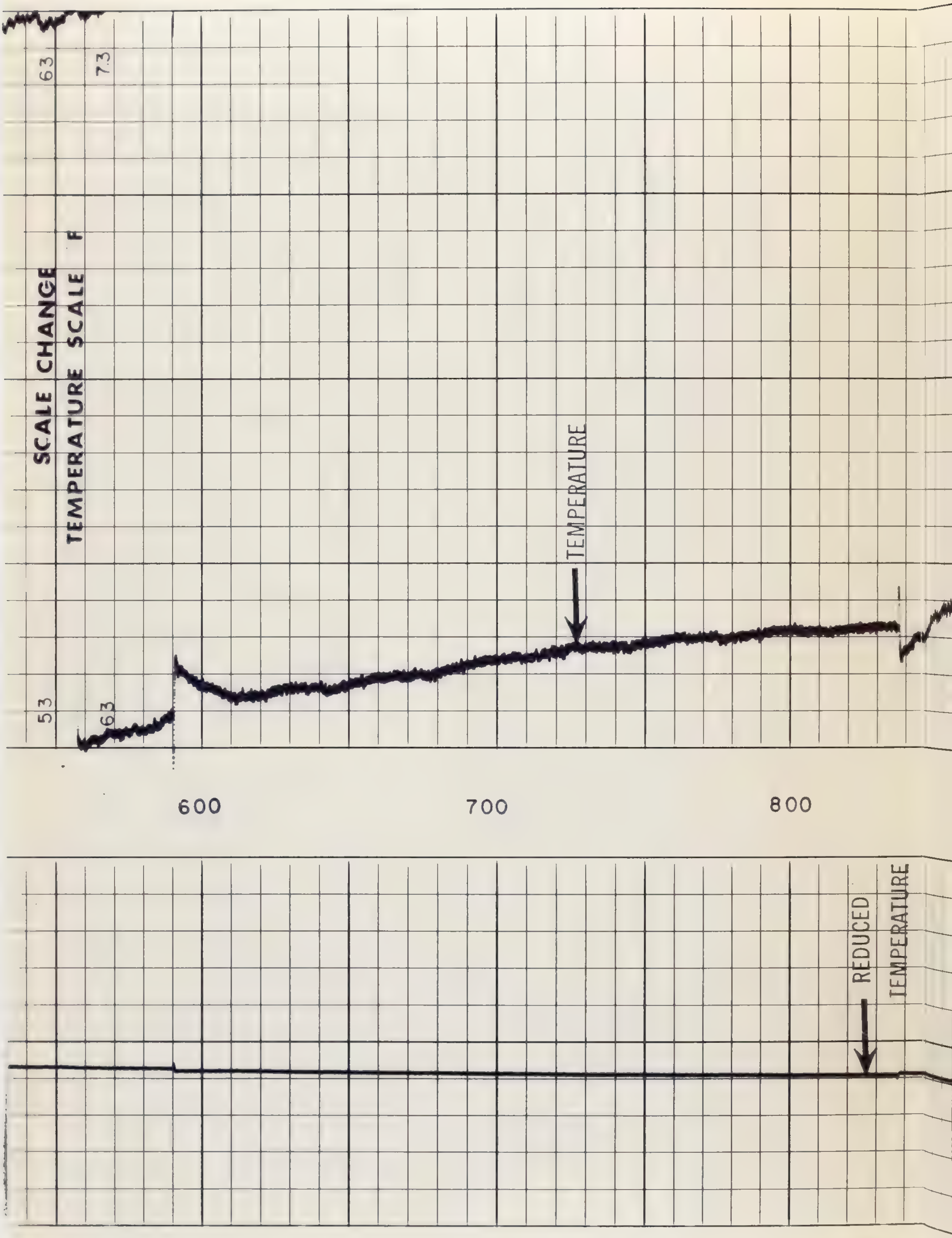
INCREASES ←

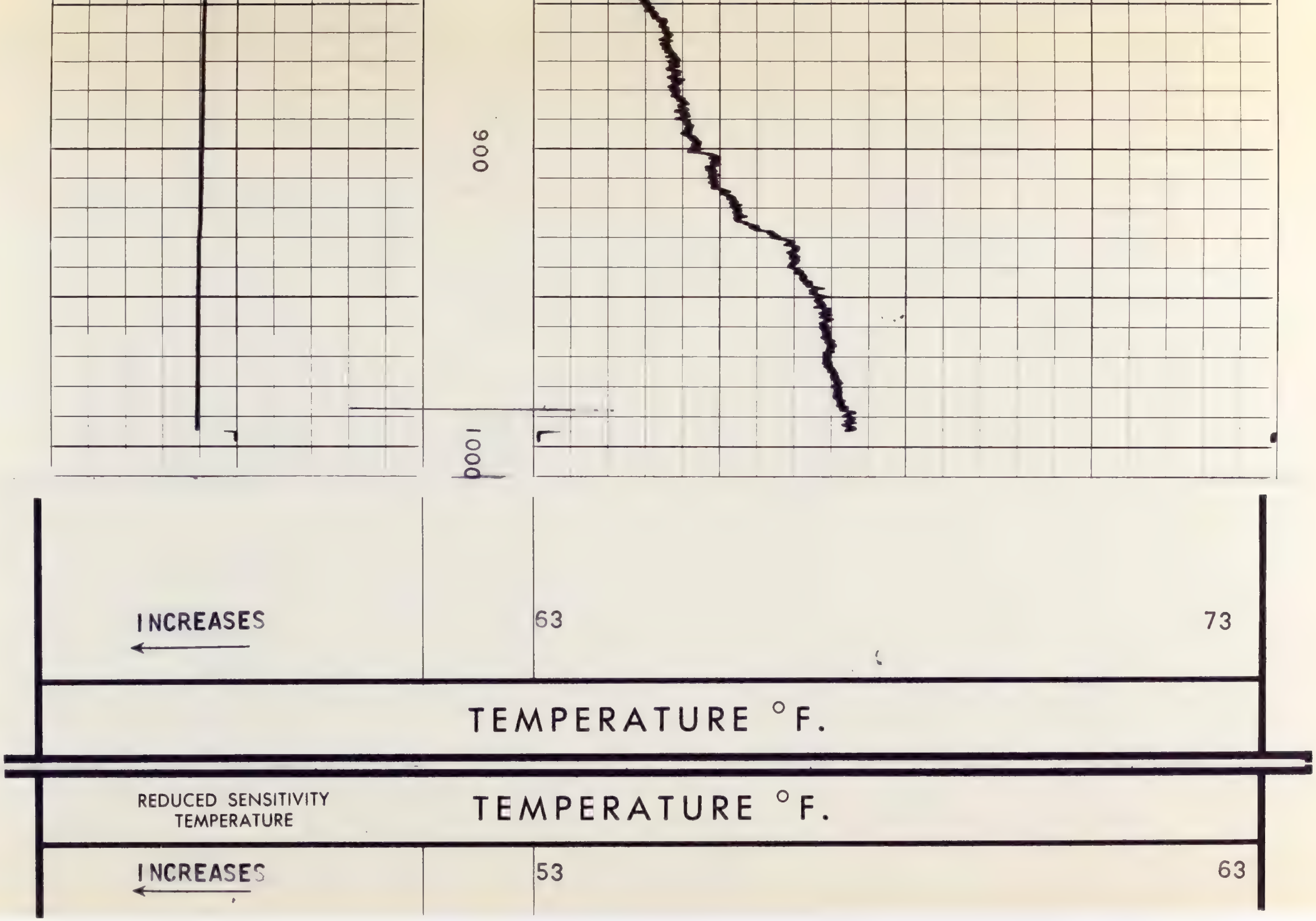
53

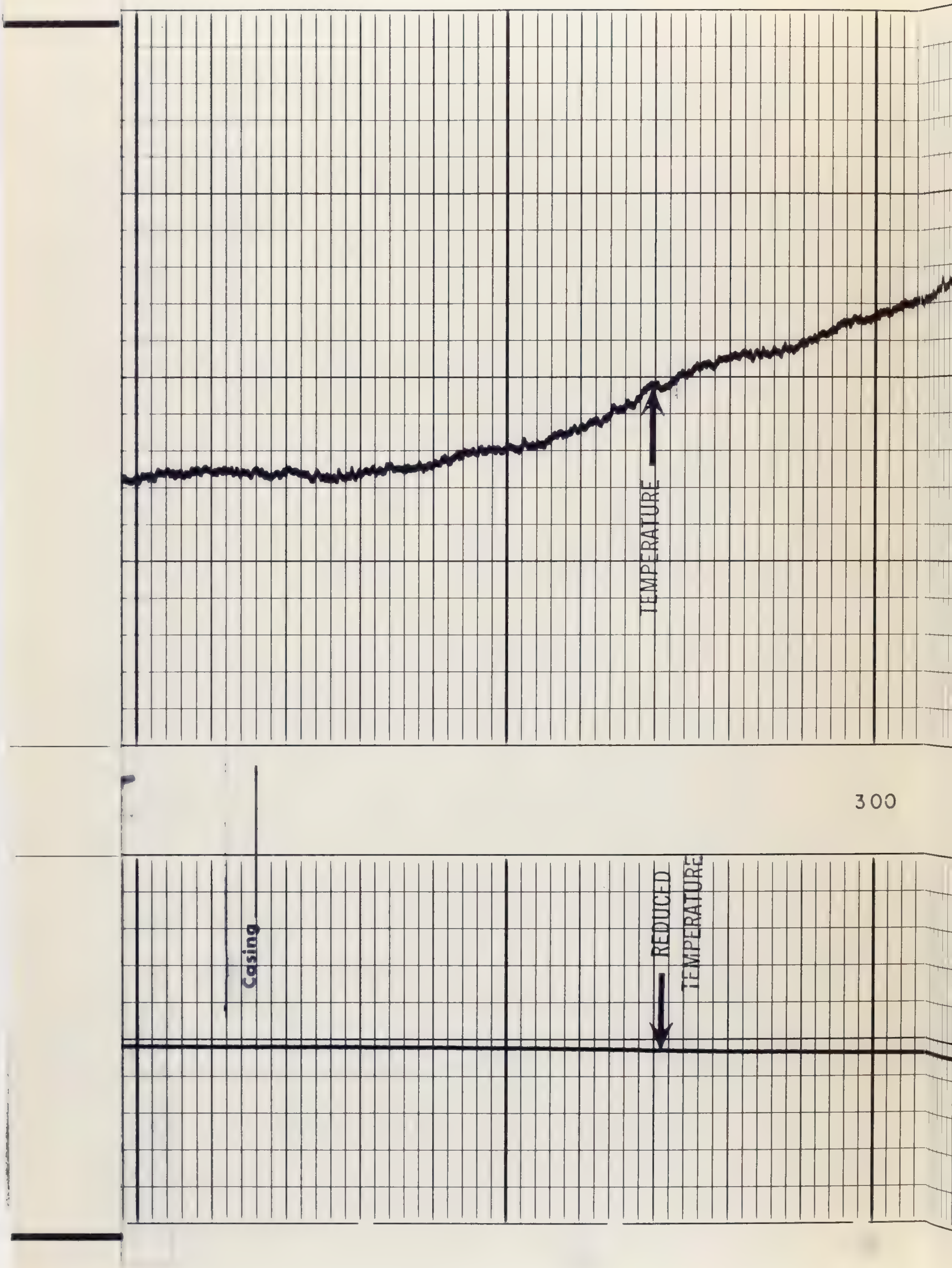
63

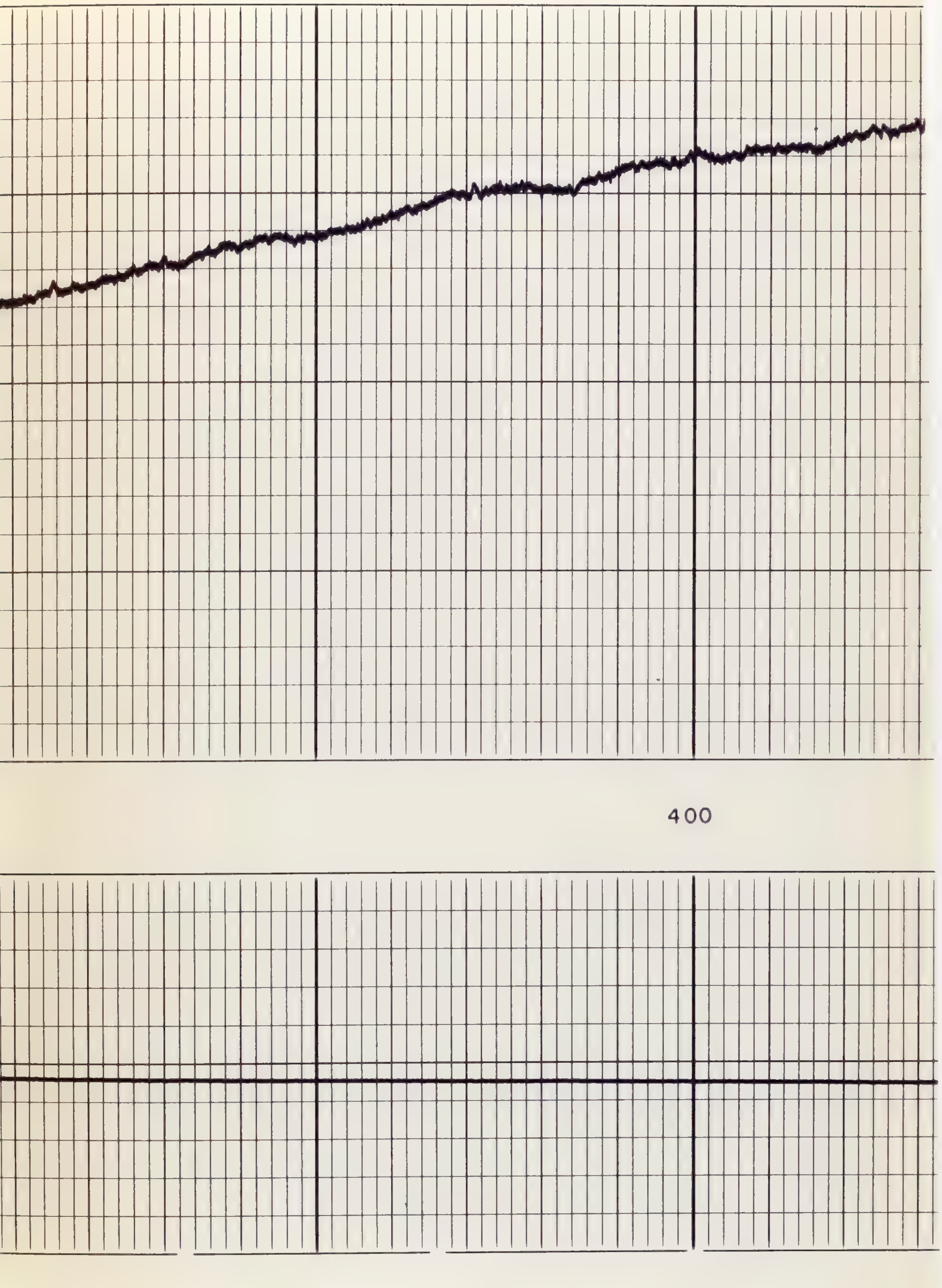


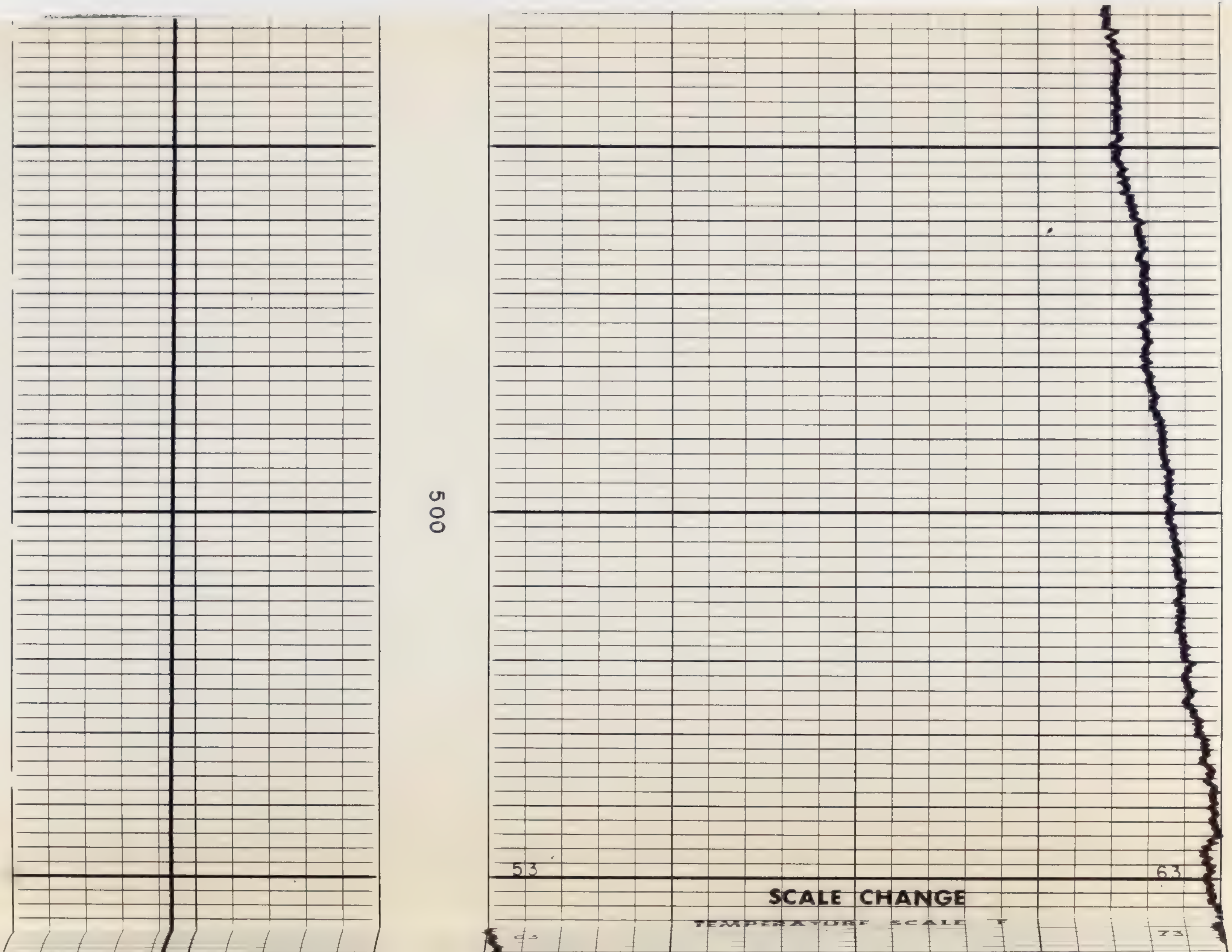

300
400
500

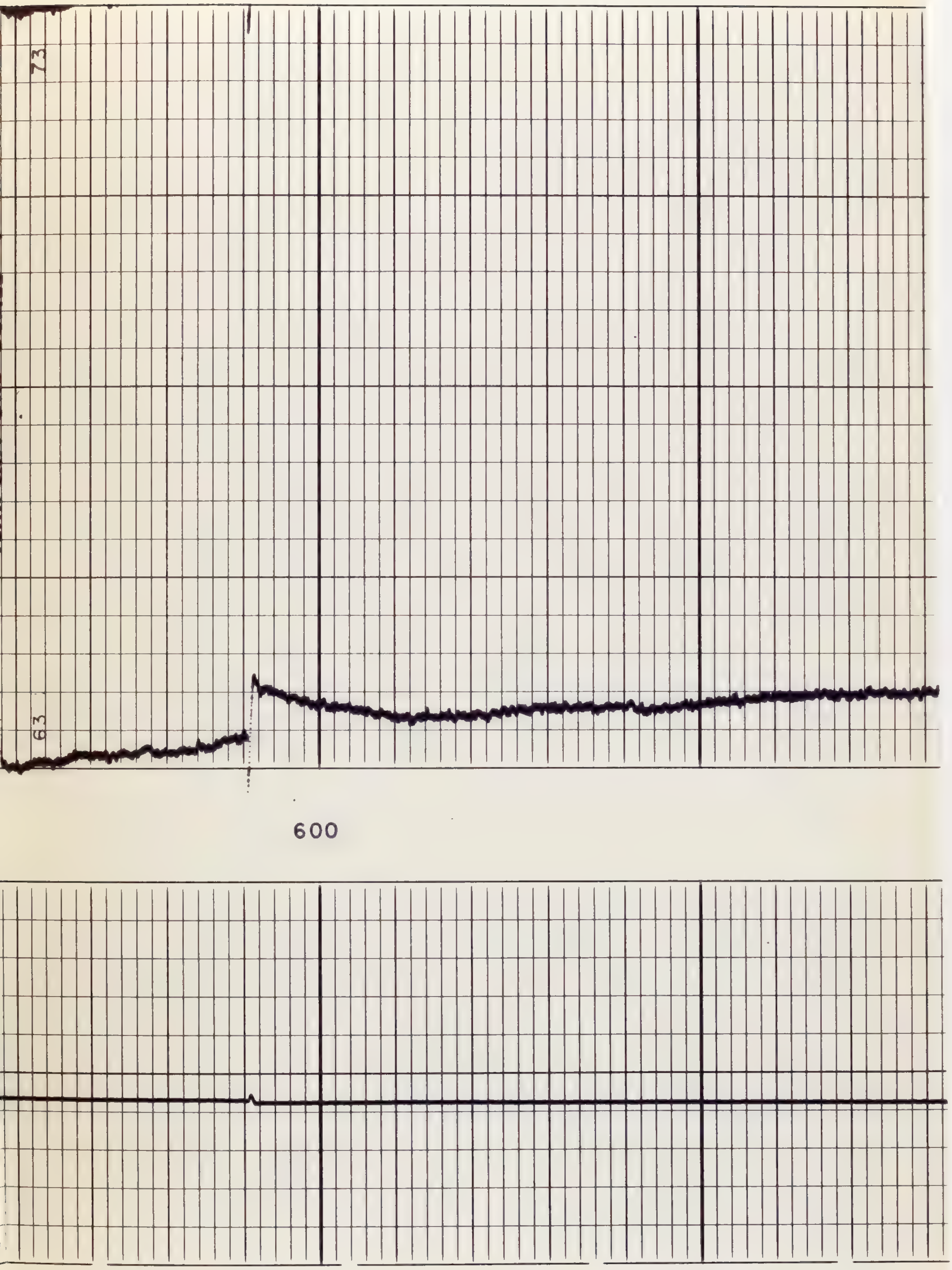

SCALE CHANGE
TEMPERATURE SCALE F
63
73
53
63
TEMPERATURE
600
700
800
REDUCED TEMPERATURE

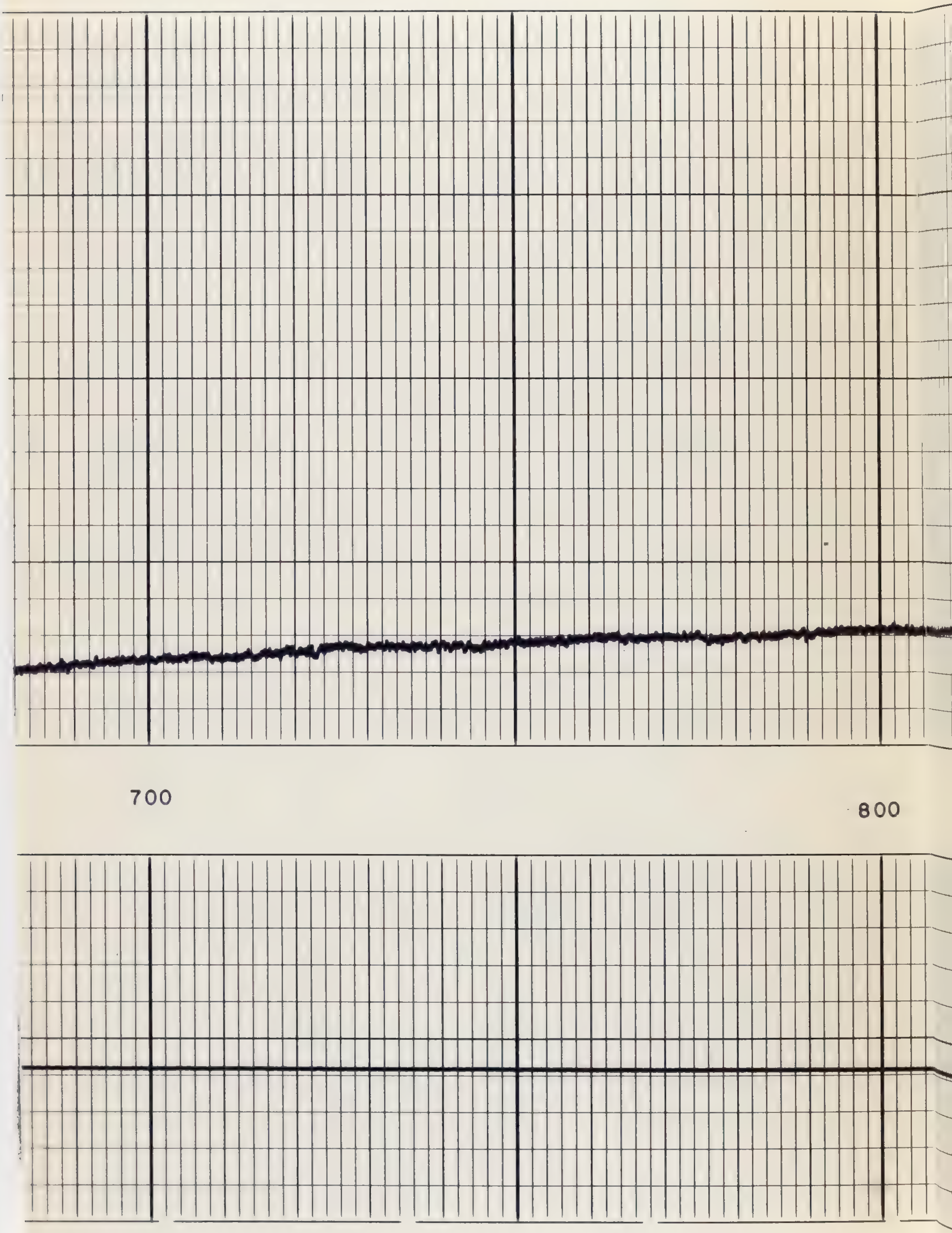

900
1000
INCREASES
63
73
TEMPERATURE °F.
REDUCED SENSITIVITY TEMPERATURE
TEMPERATURE °F.
INCREASES
53
63

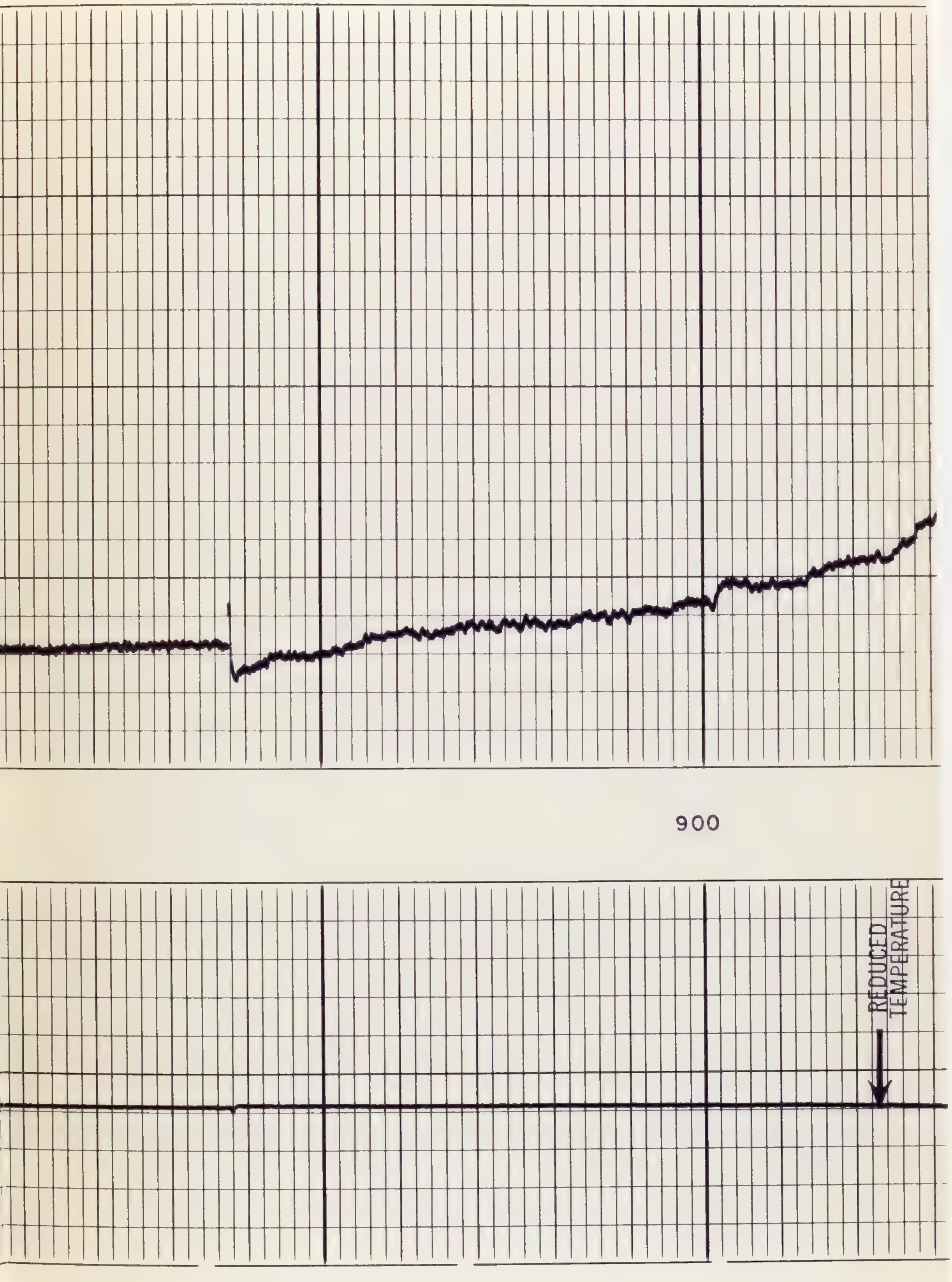

TEMPERATURE
300
Casing
REDUCED TEMPERATURE

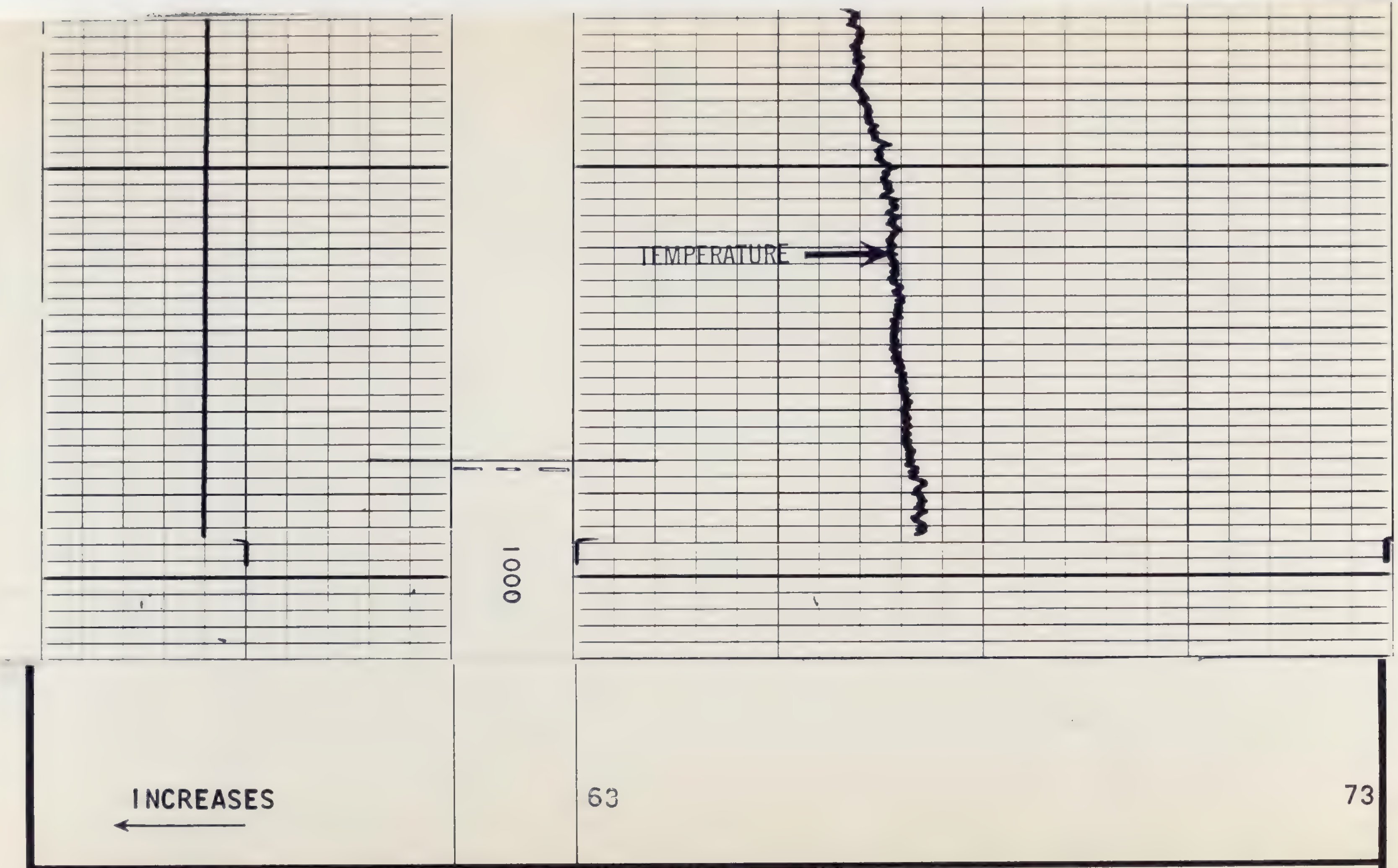

400


500
53
63
SCALE CHANGE
TEMPERATURE SCALE F
63
73


73
63
600


700
800


900
REDUCED TEMPERATURE



TEMPERATURE °F.

COMPANY ATLANTIC RICHFIELD COMPANY

SCHL. F. R. 986
SCHL. T. D 987
DRLR. T. D. 986.5

WELL SORGHUM GULCH NO. 20
FIELD SORGHUM GULCH

WELL SORGHUM GULCH NO. 20 DRLR. T. D. 986.5

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

SG-21

Schlumberger

BOREHOLE COMPENSAT
SONIC LOG - GAMMA R

(WITH CALIPER)

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL SORGHUM GULCH #21
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD CO.

WELL SORGHUM GULCH NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.
2101.6 FSL& 1528.6 FEL

Sec. 13 Twp. 3S Rge. 97W

Other Services
DLL
BHC

Permanent Datum: GL ; Elev.: 6811
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 68
D.F. 68
G.L. 68

Date	1/7/75			
Run No.	ONE			
Depth—Driller	1036			
Depth—Logger	1037			
Btm. Log Interval	1034			
Top Log Interval	153			
Casing—Driller	8 5/8@ 140	@	@	@
Casing—Logger	153			
Bit Size	7 7/8			
Type Fluid in Hole	WATER			
Fluid Level	195			
Dens. | Visc.				
pH | Fluid Loss	ml	ml	ml	
Source of Sample	MUD PIT			
R_m @ Meas. Temp.	14.7 @ 69 °F	@ °F	@ °F	@
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: R_{mf} | R_{mc}	CLEAR WATER			
R_m @ BHT	14.7 @ 70 °F	@ °F	@ °F	@
Time Since Circ.	10 HOURS			
Max. Rec. Temp.	70 °F	°F	°F	
Equip. | Location	5602 | G.J.			
Recorded By	GARGHOUTI			
Witnessed By	BURNS			

SWS—1383-H

°F °F °F °F °F ml

1 8 9

ED
AY

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES				
Date / Sample No.				
Depth - Driller				
Type Fluid in Hole				
Dens. / Visc.				
ph / Fluid Loss		ml		ml
Source of Sample				
R_m @ Meas. Temp.	@	°F	@	°F
R_{mf} @ Meas. Temp.	@	°F	@	°F
R_{mc} @ Meas. Temp.	@	°F	@	°F
Source: R_{mf} / R_{mc}				
R_m @ BHT	@	°F	@	°F
R_{mf} @ BHT	@	°F	@	°F
R_{mc} @ BHT	@	°F	@	°F

SCALE CHANGES			
Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA				
Run No.	ONE			
Sonic Panel No.	439			
Sonic Cart No.	166			
Sonic Sonde No.	499			
Mem. Panel No.	235			
G.R. Cart. No.	284			
G.R. Panel No.	169			
Caliper No	851			
TTR No.				
Cent. Device	CMEH & VCD & FINS			
Stand off - Inches	CENT.			
Time Const. - Sec.	2			
Speed - F.P.M.	30			
VDL	58			

REMARKS

Service Order No. - 22494

BHC
T0=100
CART GAIN=1/5

VDL
MODEL VT-FR 5'
NORMAL
.1 MSEC. ON CRP
TX=1
CART GAIN= 1/20

NOTE: MECH ZERO SHIFT ON CALIPER,
BHC
2 SINGLE AT WAS REPEATED OVER
THE ENTIRE HOLE ON A DIFFERENT SCALE

CALIBRATION DATA CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.

2 SINGLE AT WAS REPEATED OVER
THE ENTIRE HOLE ON A DIFFERENT SCALE

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.
GAMMA RAY:	110	580	15	200	150	2

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

GAMMA RAY

0 150

150 300

CALIPER

HOLE DIAM. IN INCHES

6 16

DEPTHS

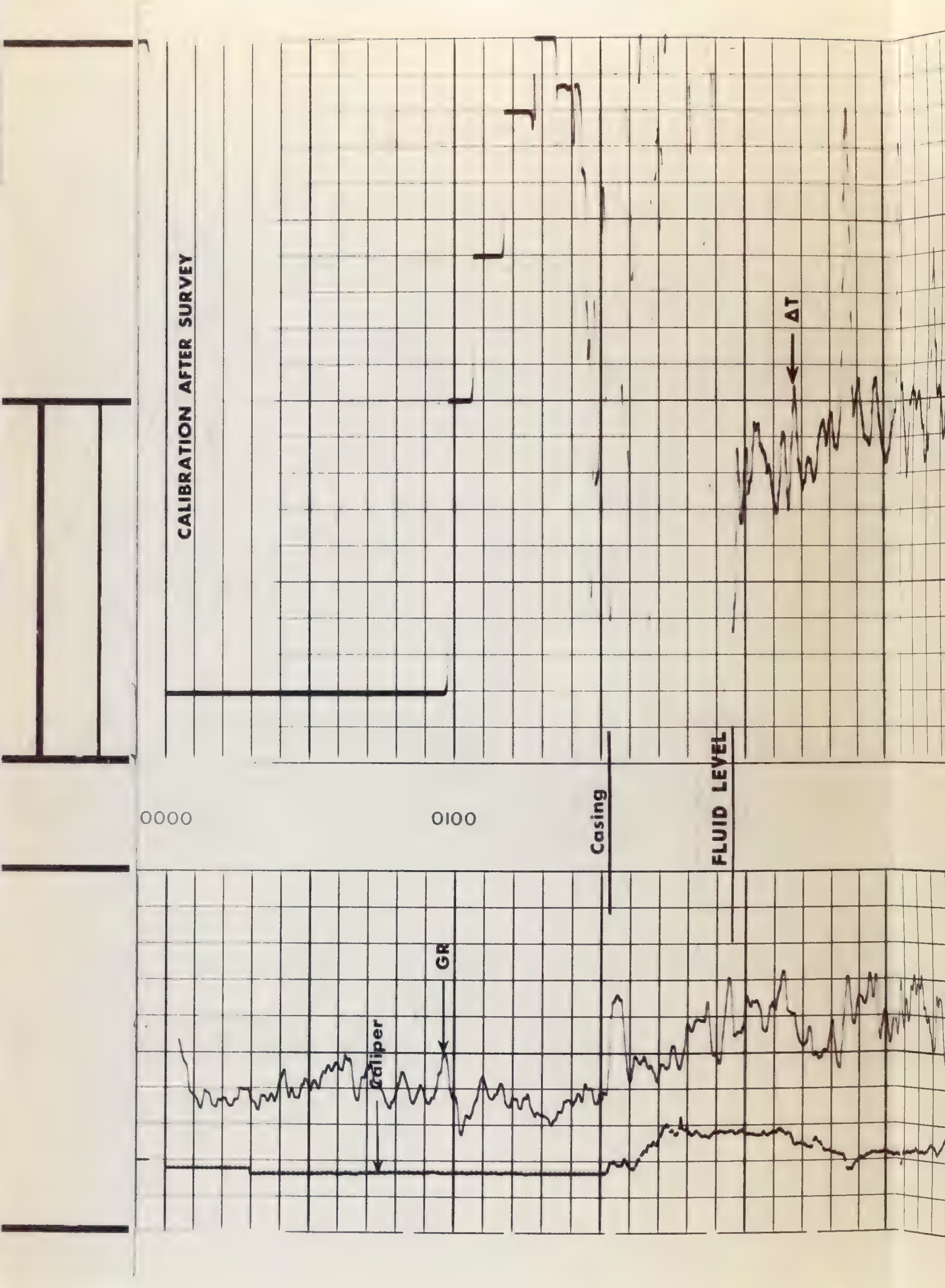
INTERVAL TRANSIT TIME

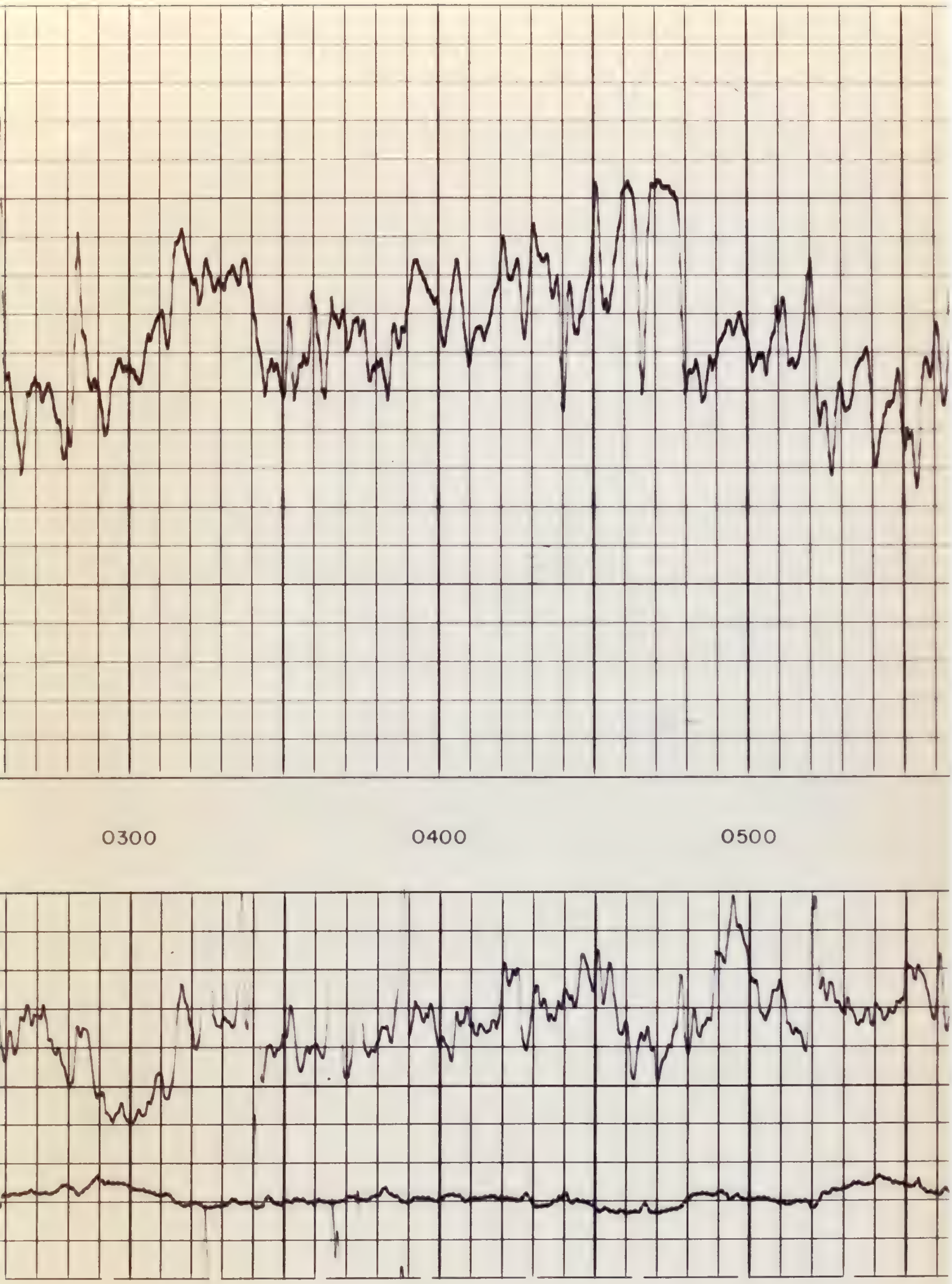
MICROSECONDS PER FOOT

T 3 R_1 2 R_2

150 100 50

250 200 150


CALIBRATION AFTER SURVEY
ΔT
0000
0100
Casing
FLUID LEVEL
GR
Caliper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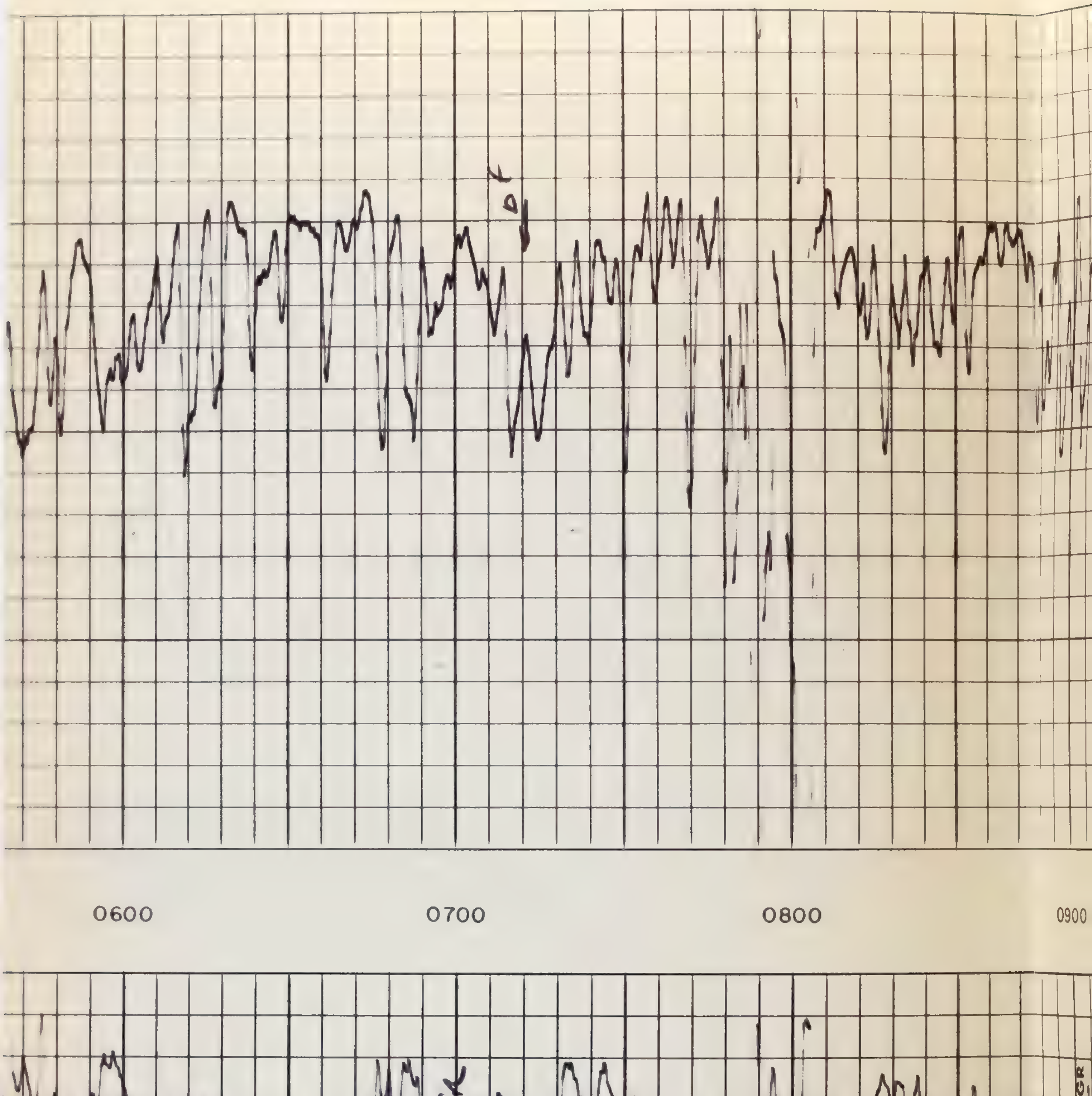
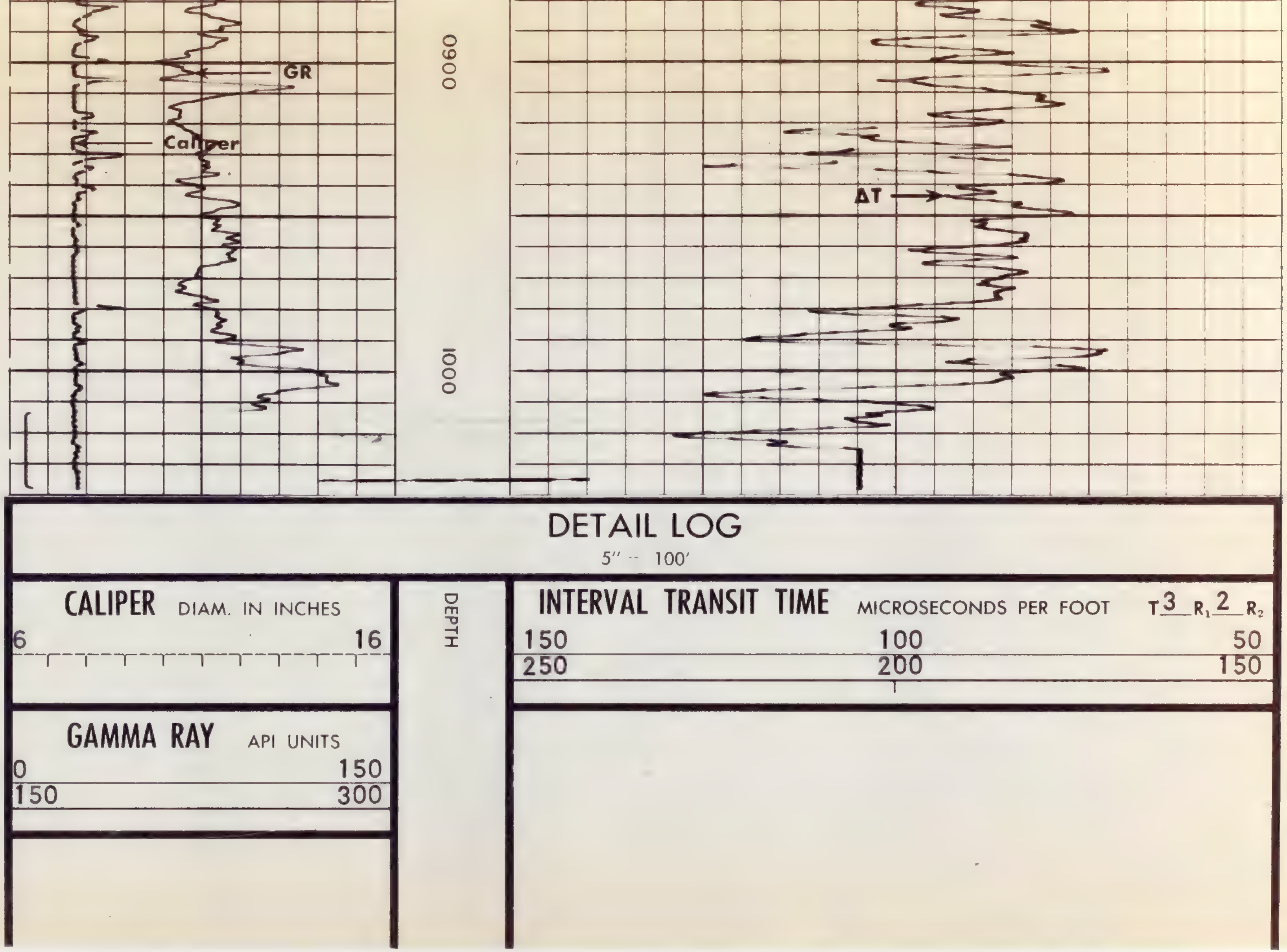
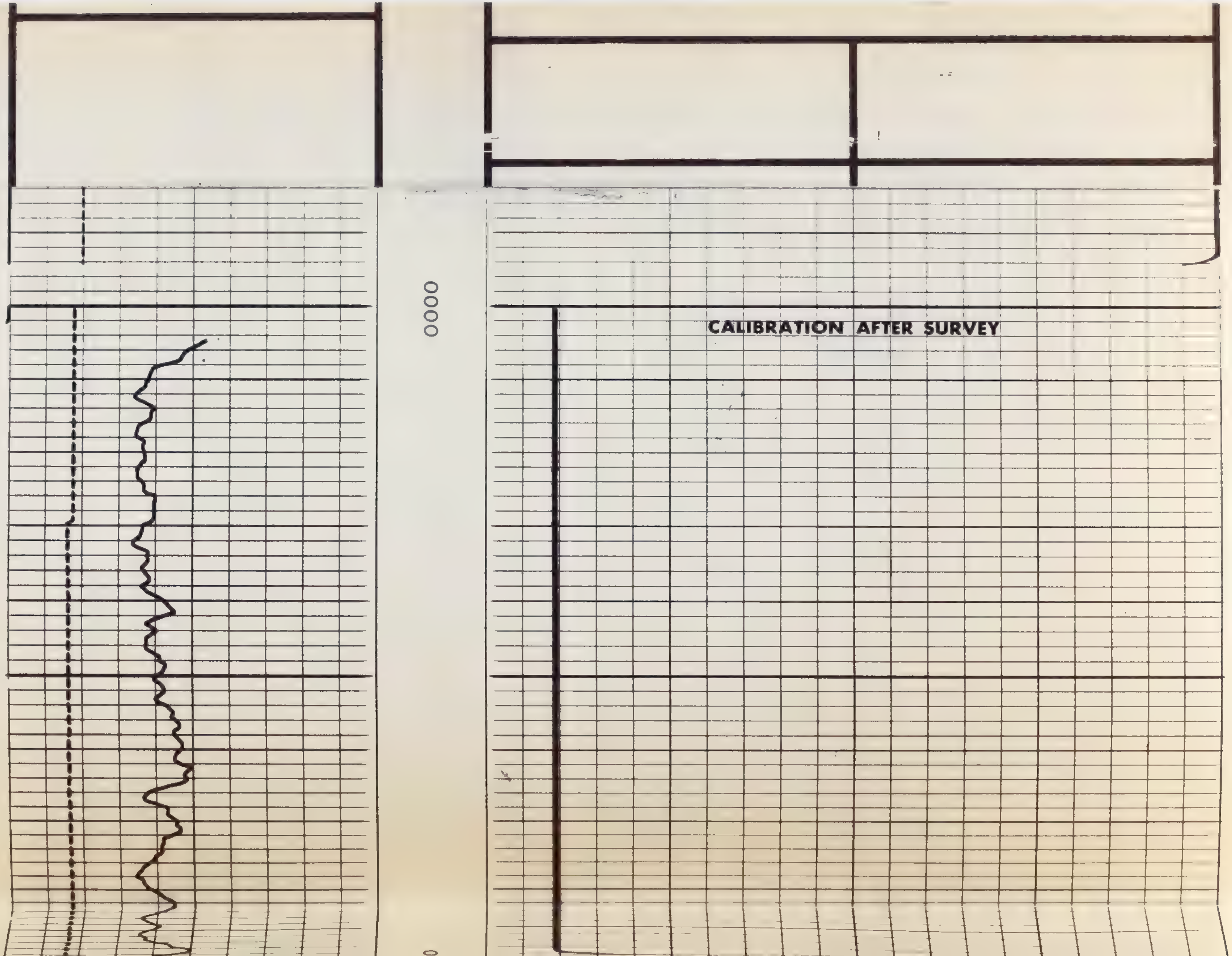
0400
0500


0600
0700
0800
0900
GR


GR
Caliper
ΔT
0900
1000
DETAIL LOG
5″ -- 100′
CALIPER DIAM. IN INCHES
6
16
GAMMA RAY API UNITS
0
150
150
300
DEPTH
INTERVAL TRANSIT TIME MICROSECONDS PER FOOT
T 3 R1 2 R2
150
100
50
250
200
150


CALIBRATION AFTER SURVEY
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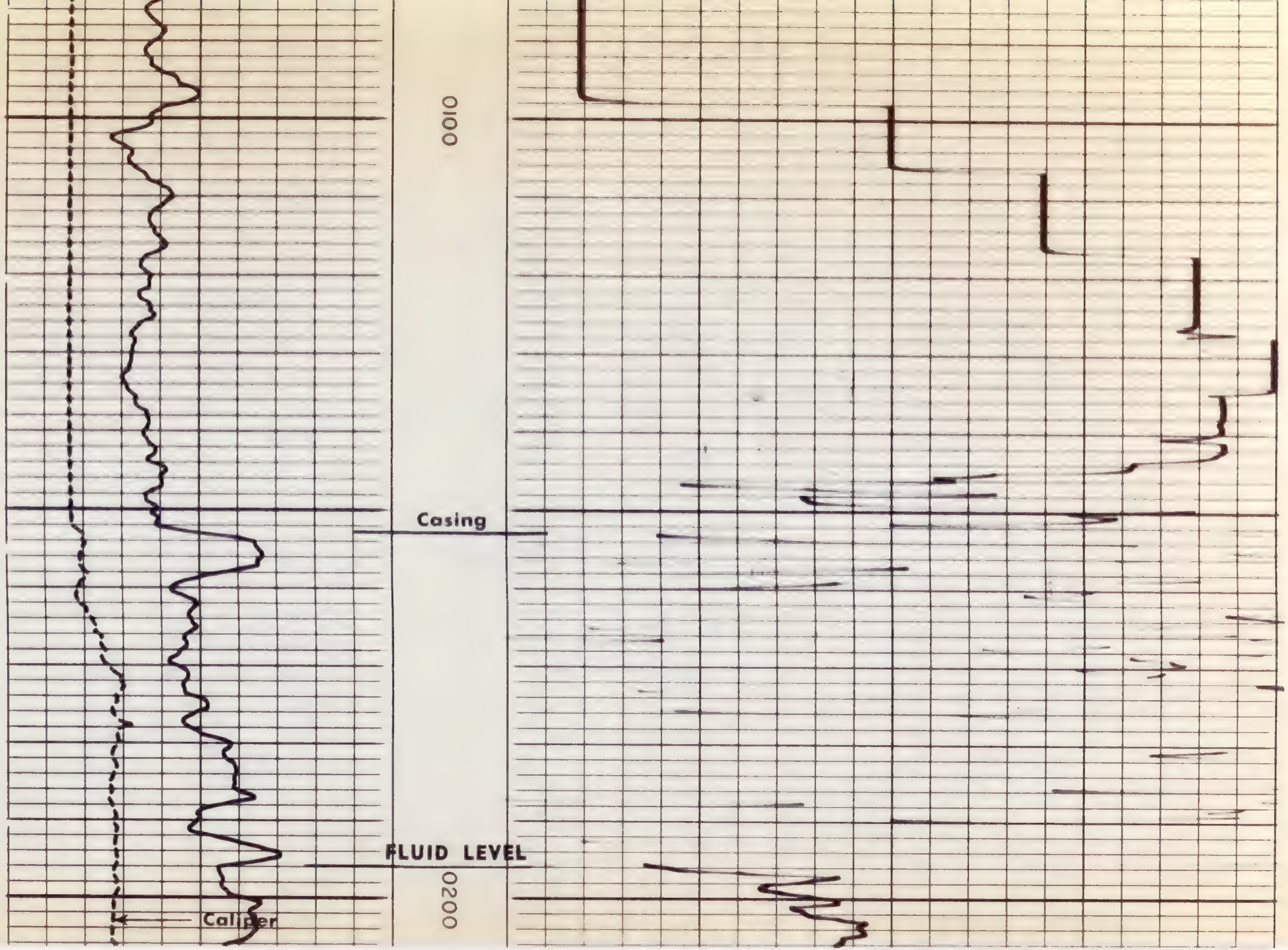
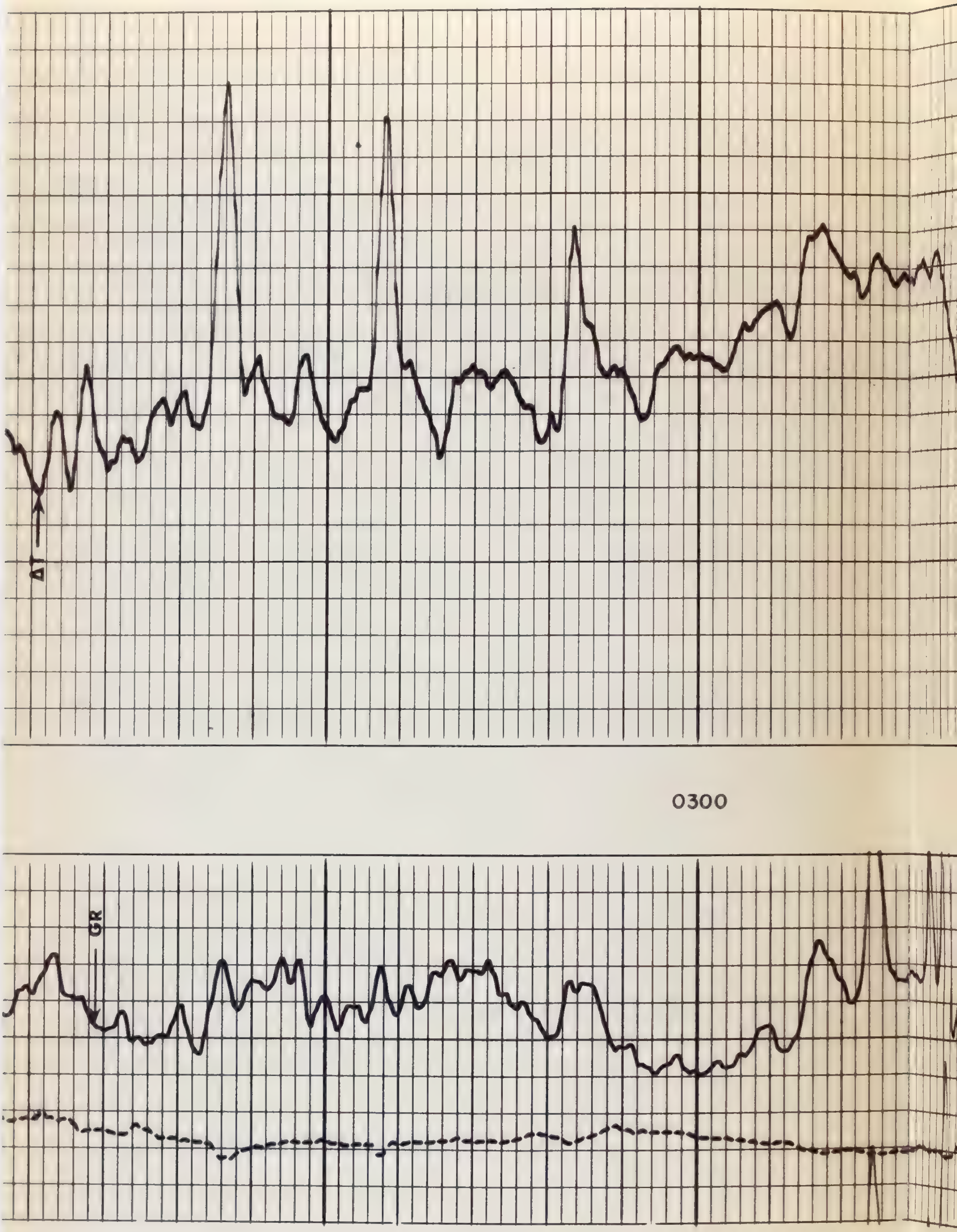
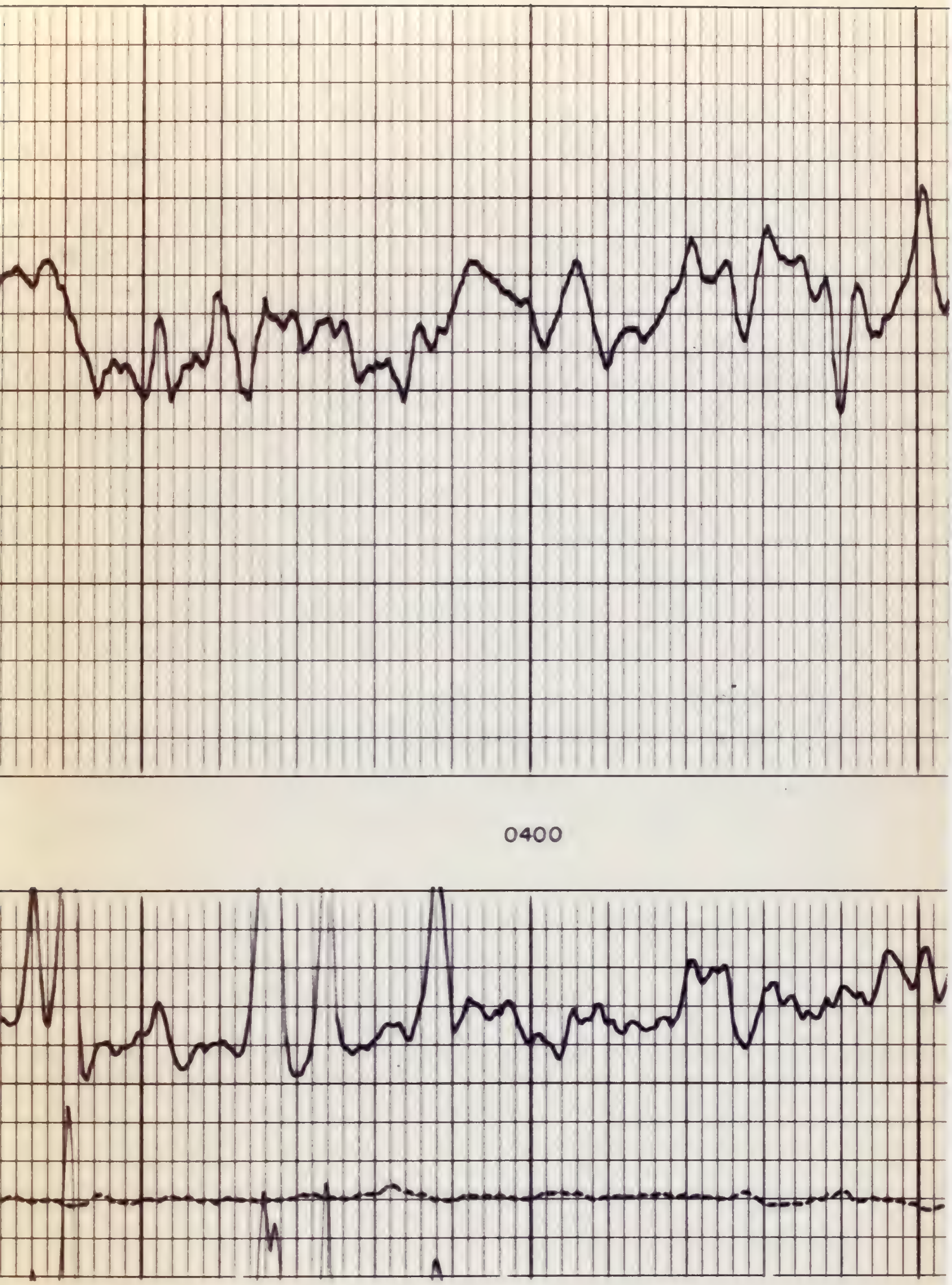

0100
Casing
FLUID LEVEL
0200
Caliper


ΔT
0300
GR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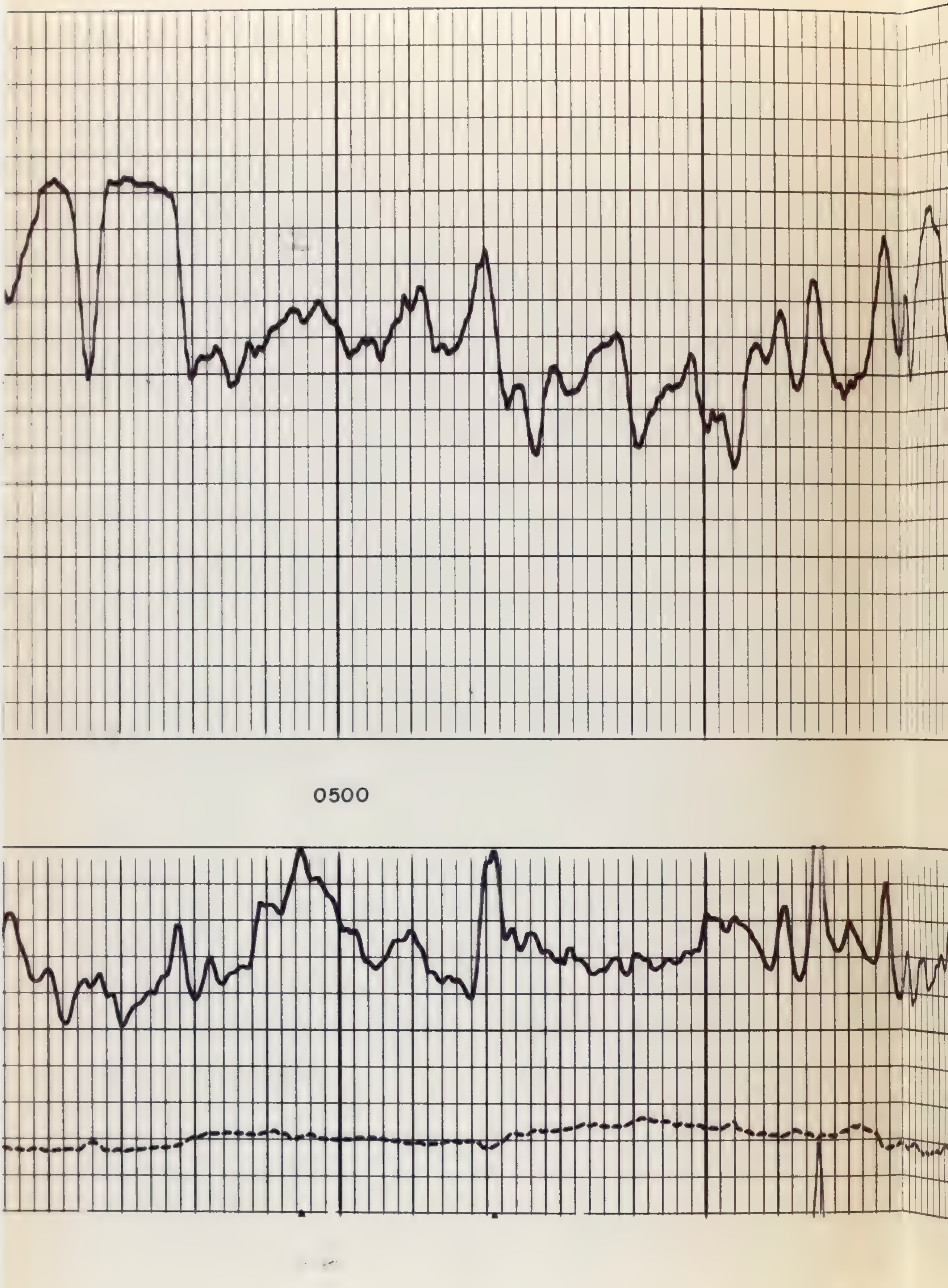
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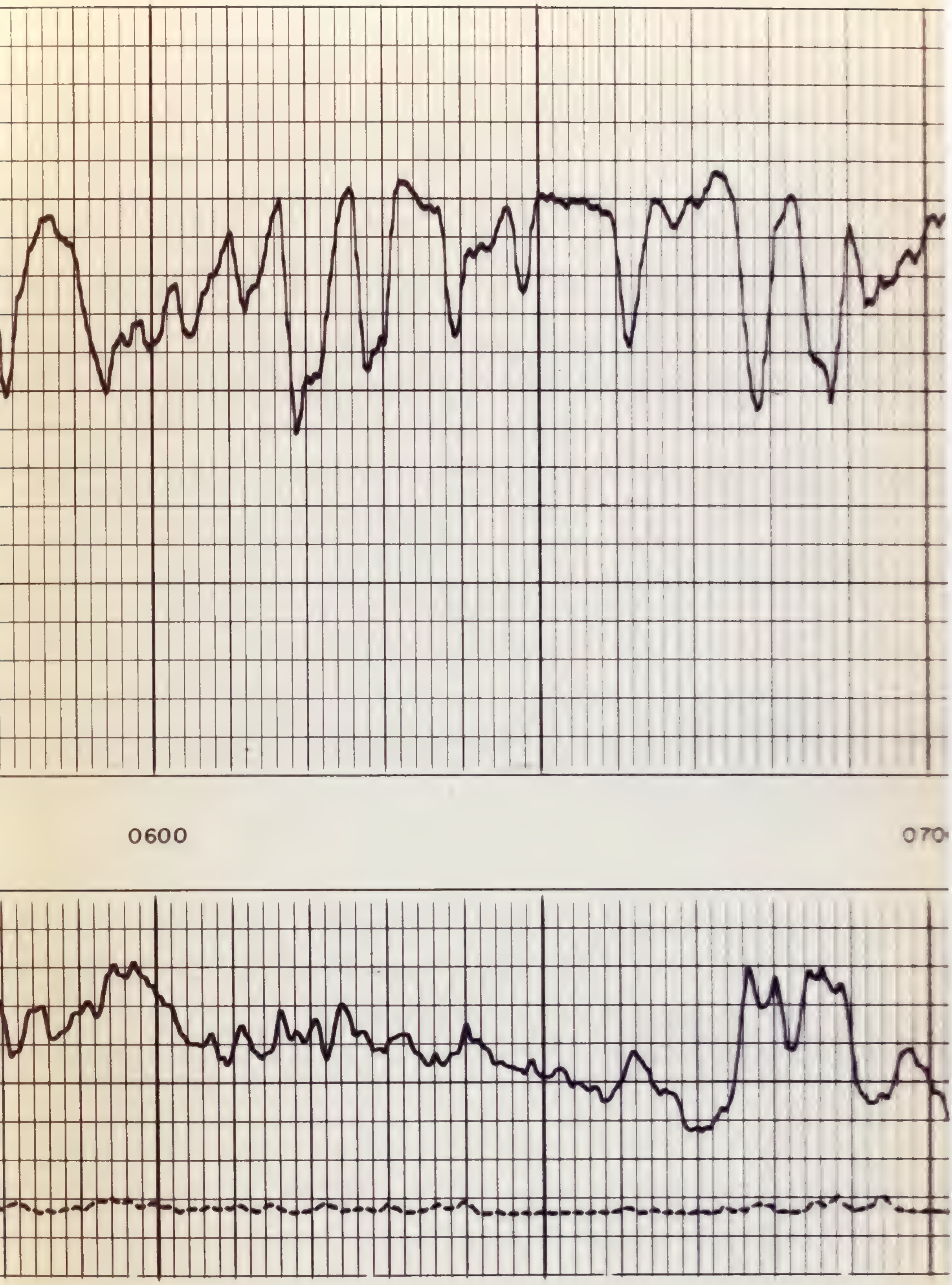
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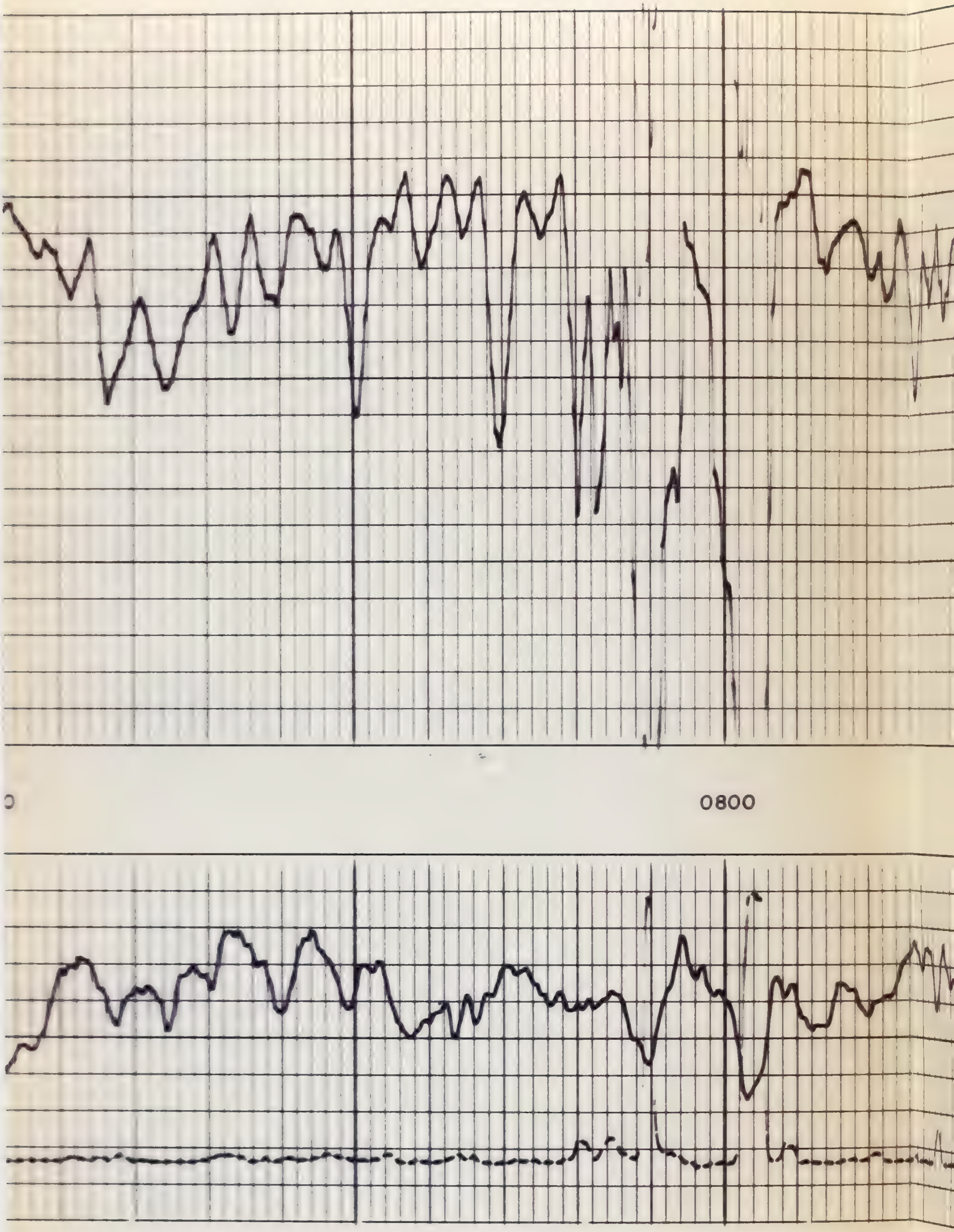
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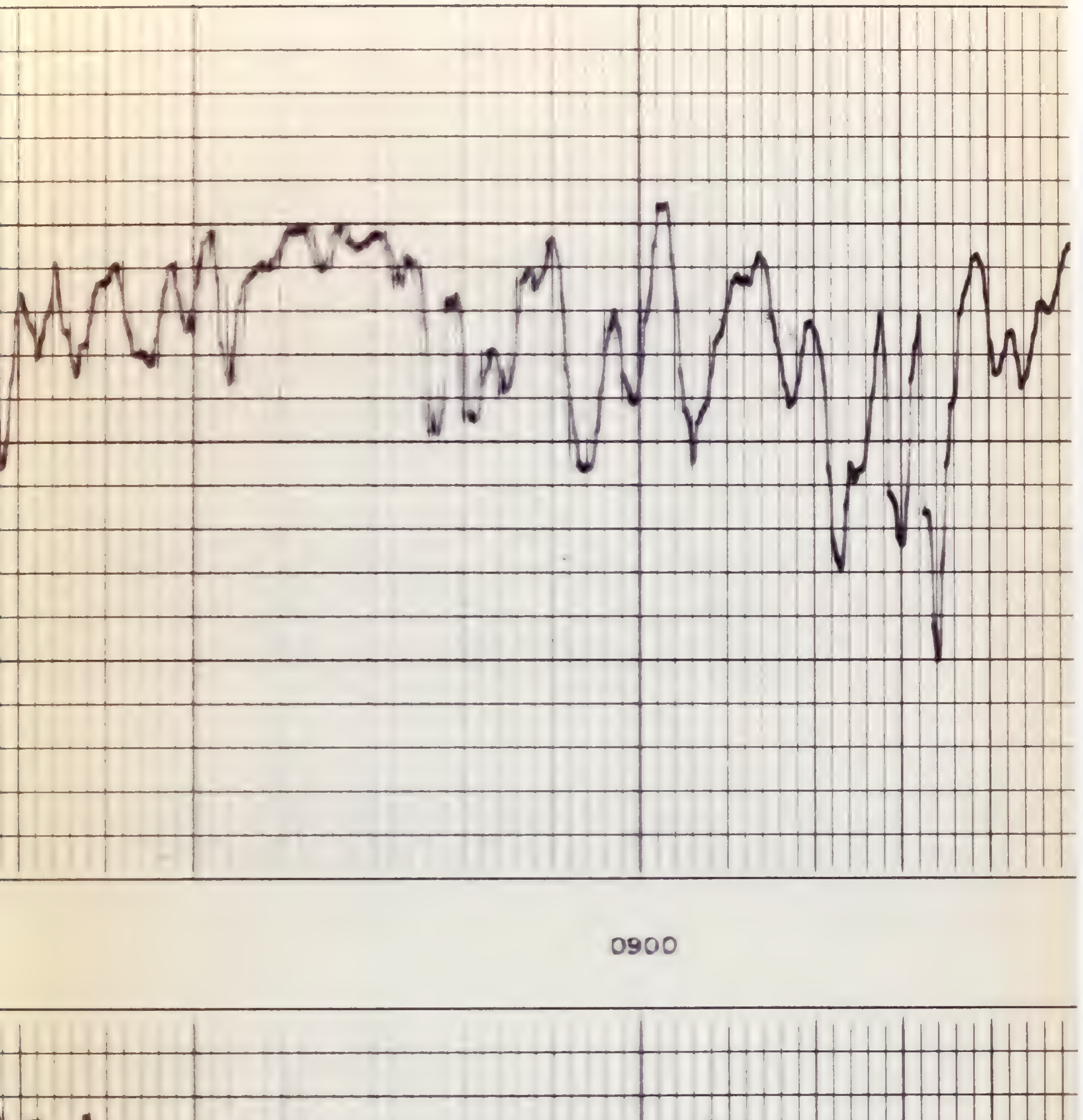

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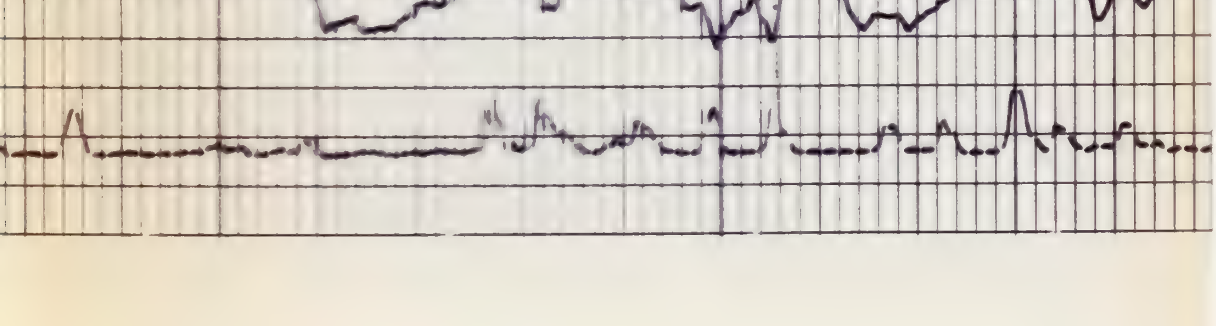
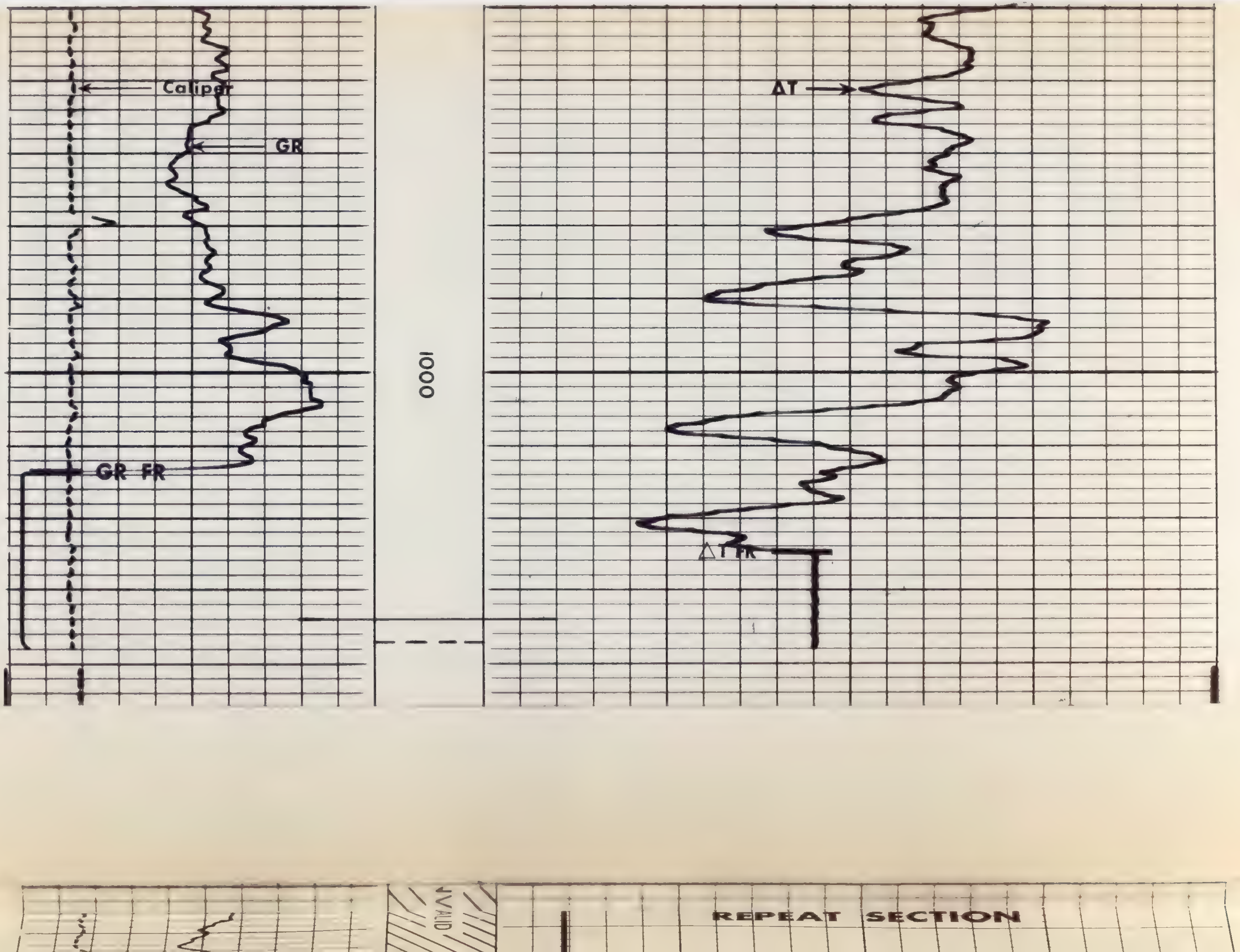
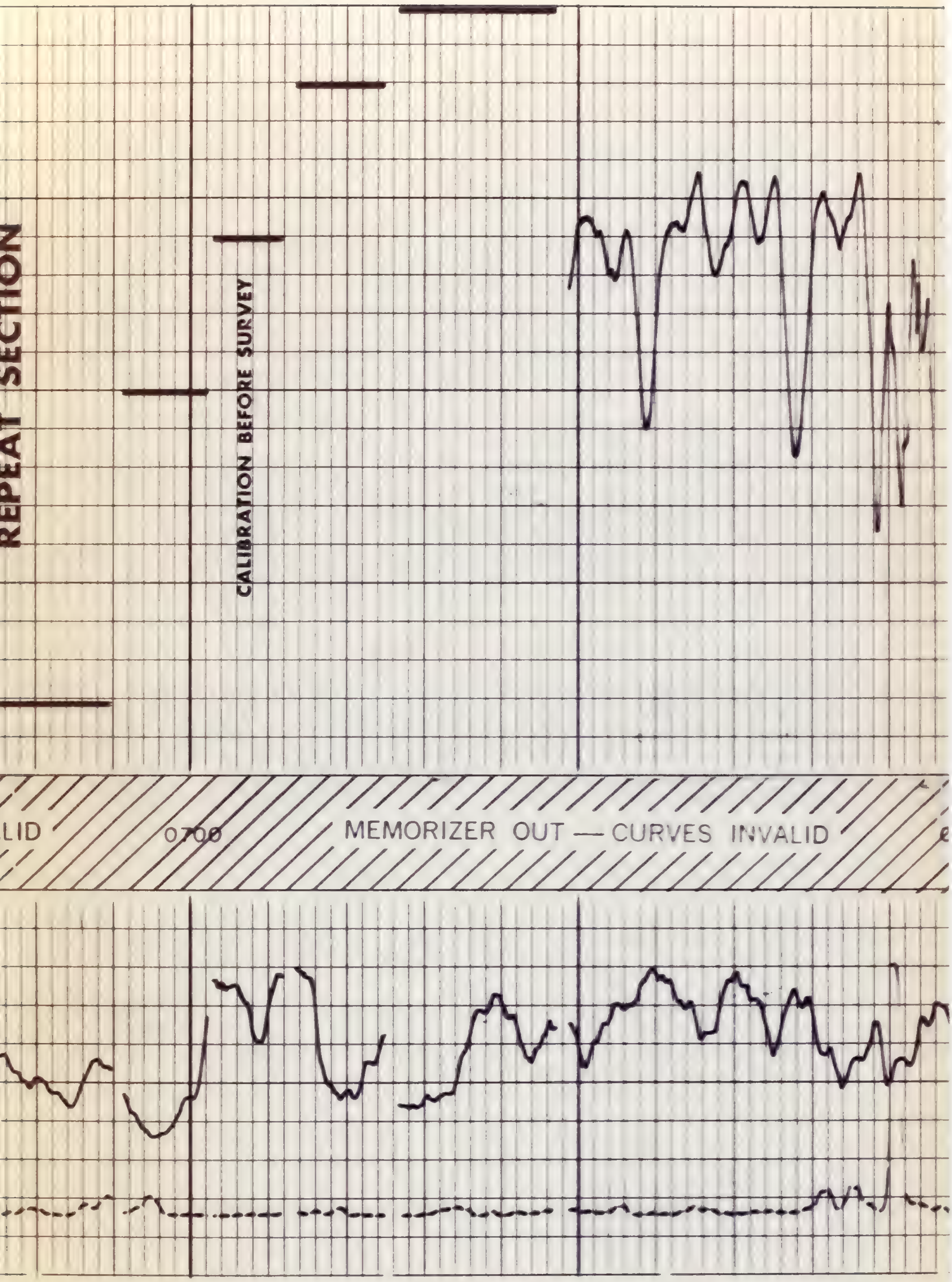
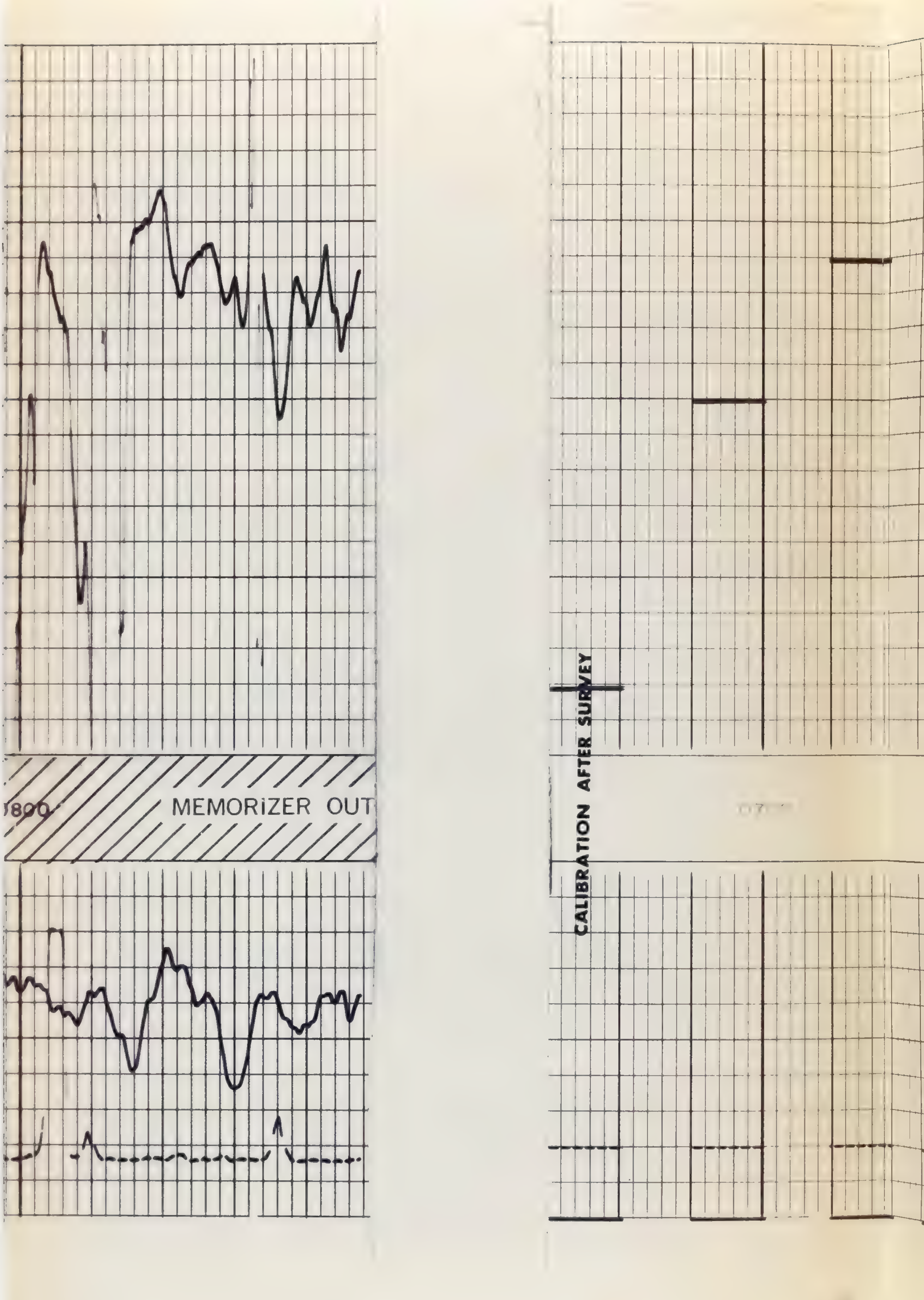
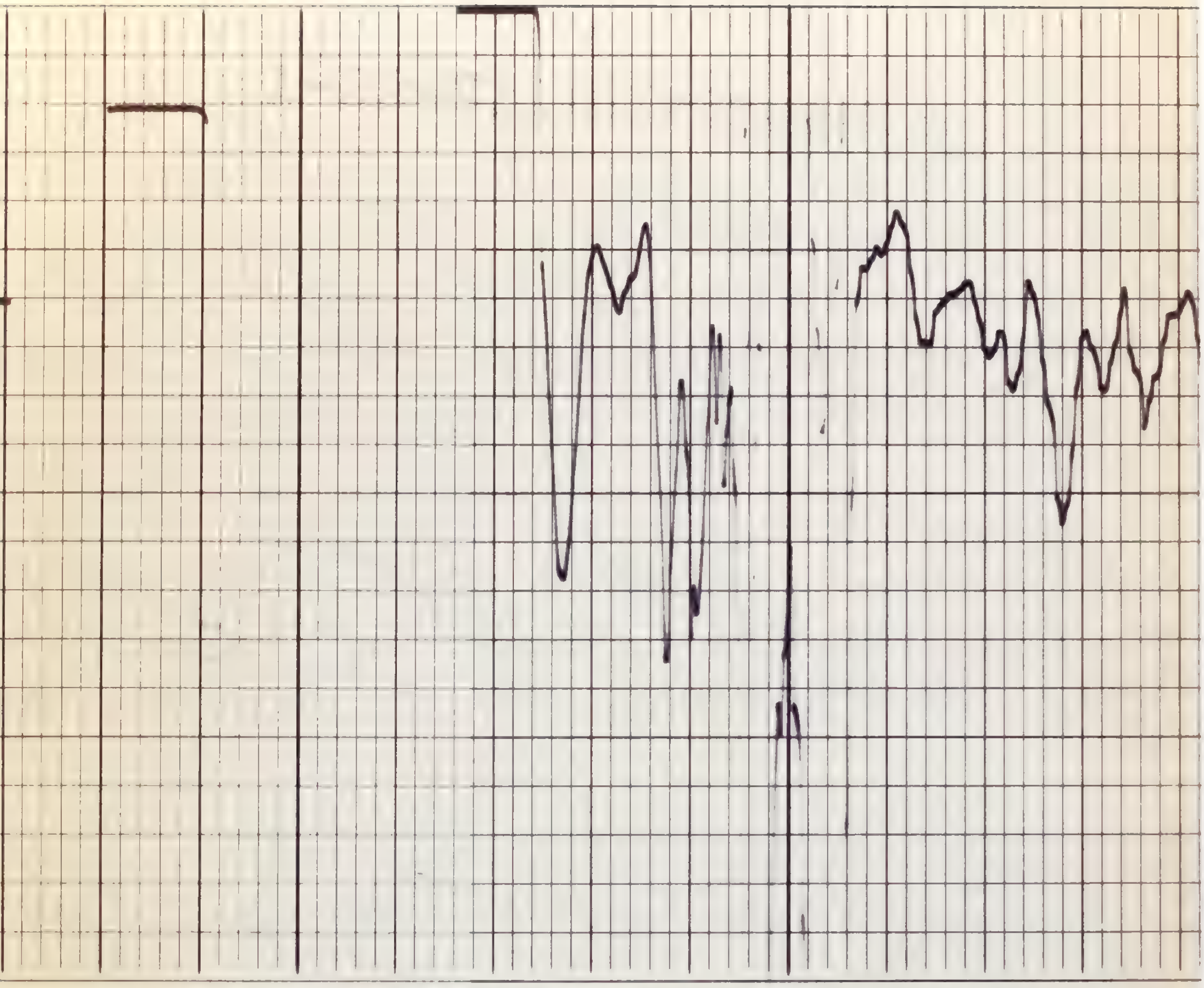



Caliper
GR
GR FR
1000
ΔT
ΔT FR
NVALID
REPEAT SECTION


REPEAT SECTION
CALIBRATION BEFORE SURVEY
LID
0700
MEMORIZER OUT — CURVES INVALID


0800
MEMORIZER OUT
CALIBRATION AFTER SURVEY



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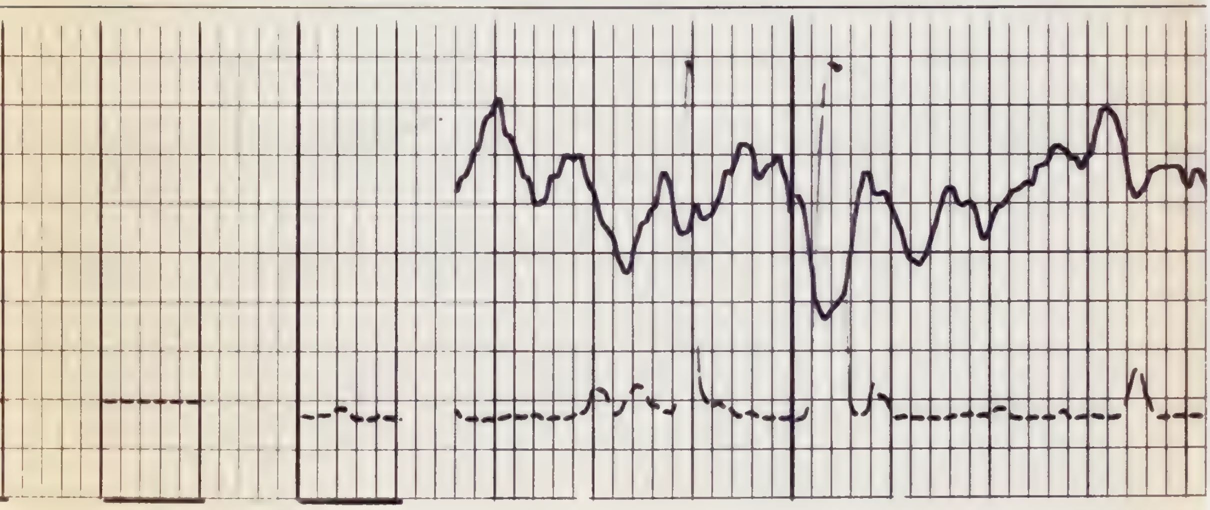

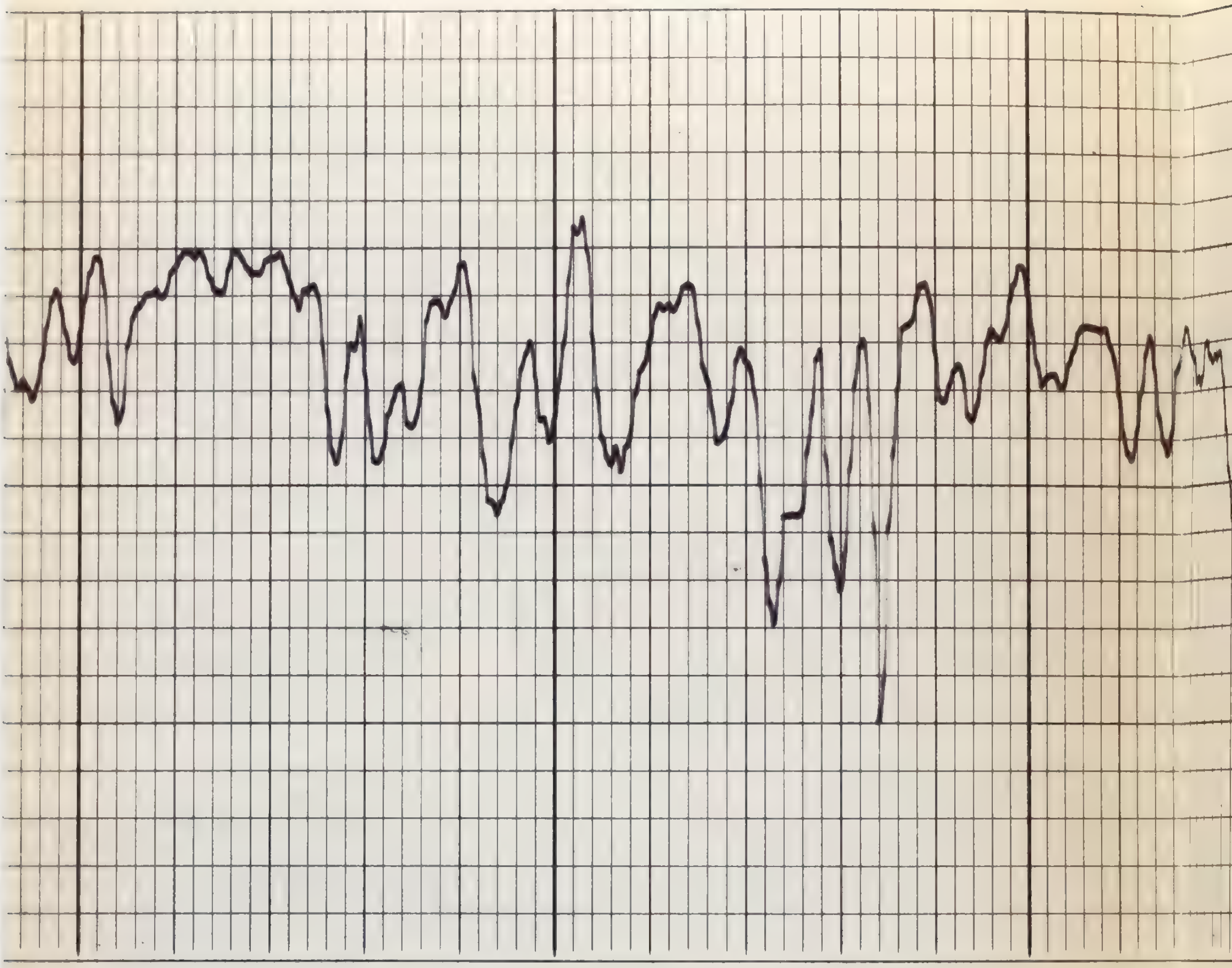

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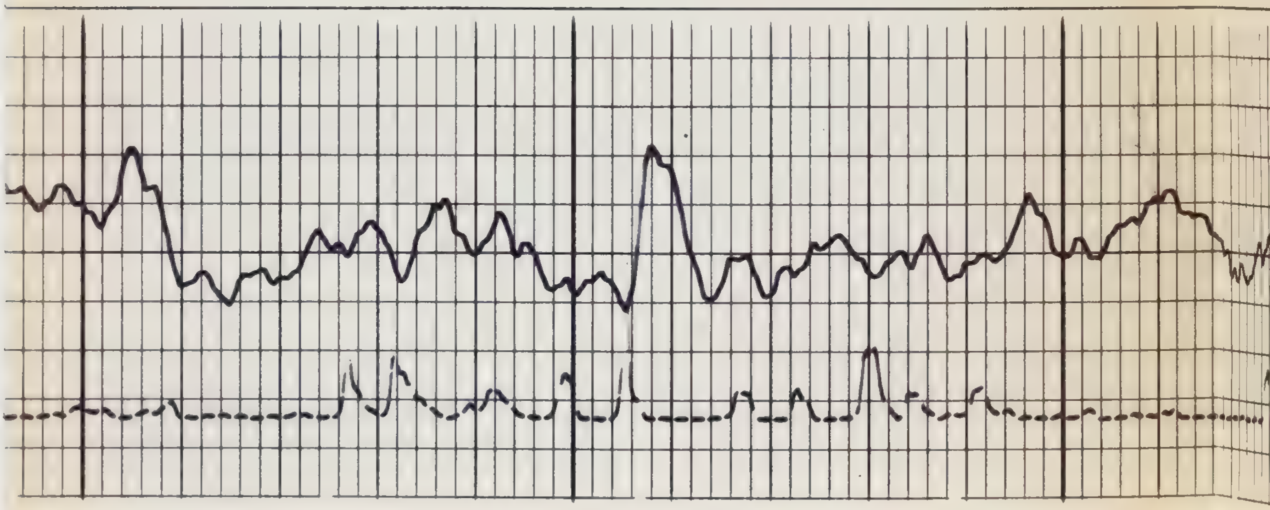
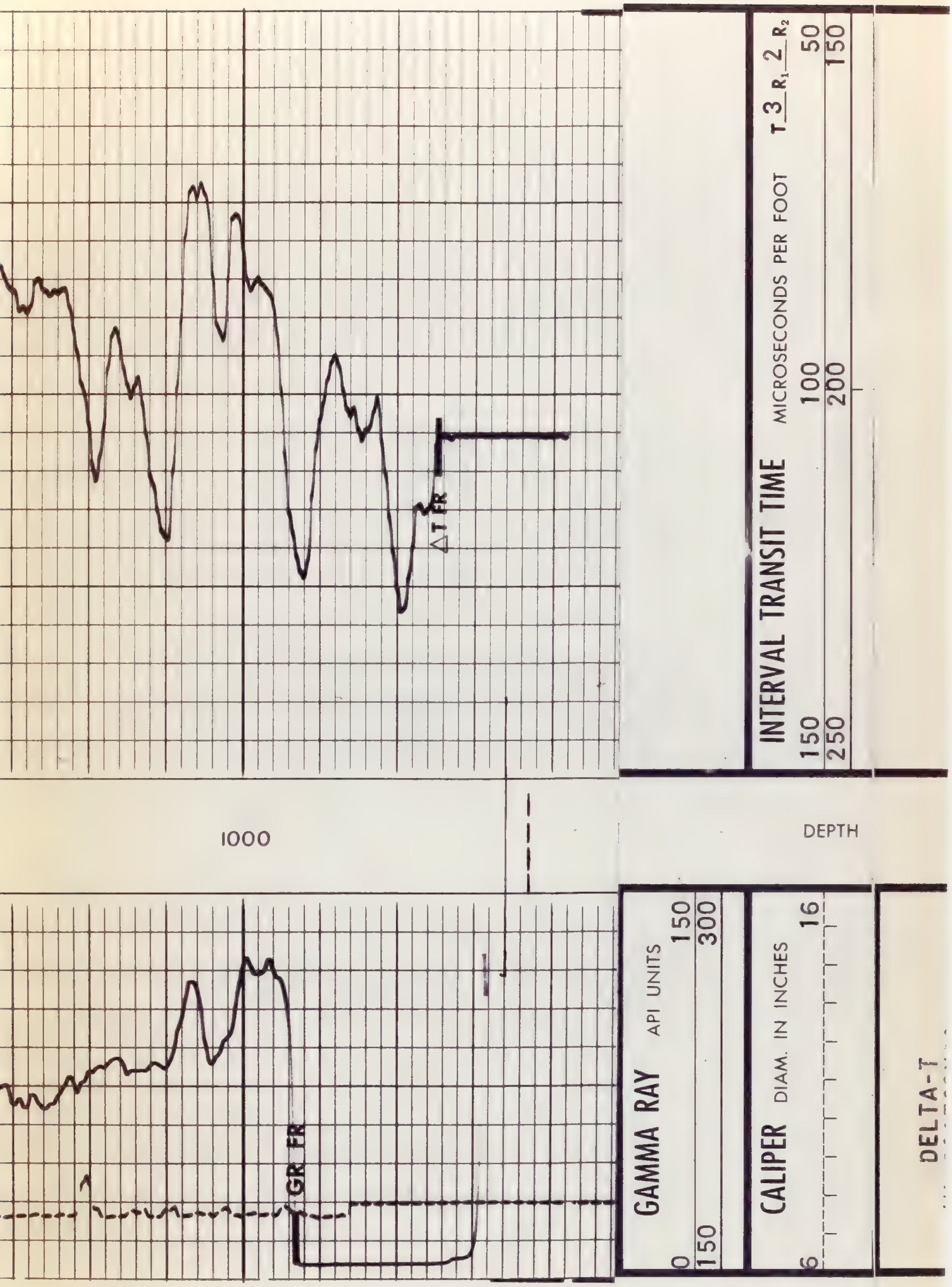
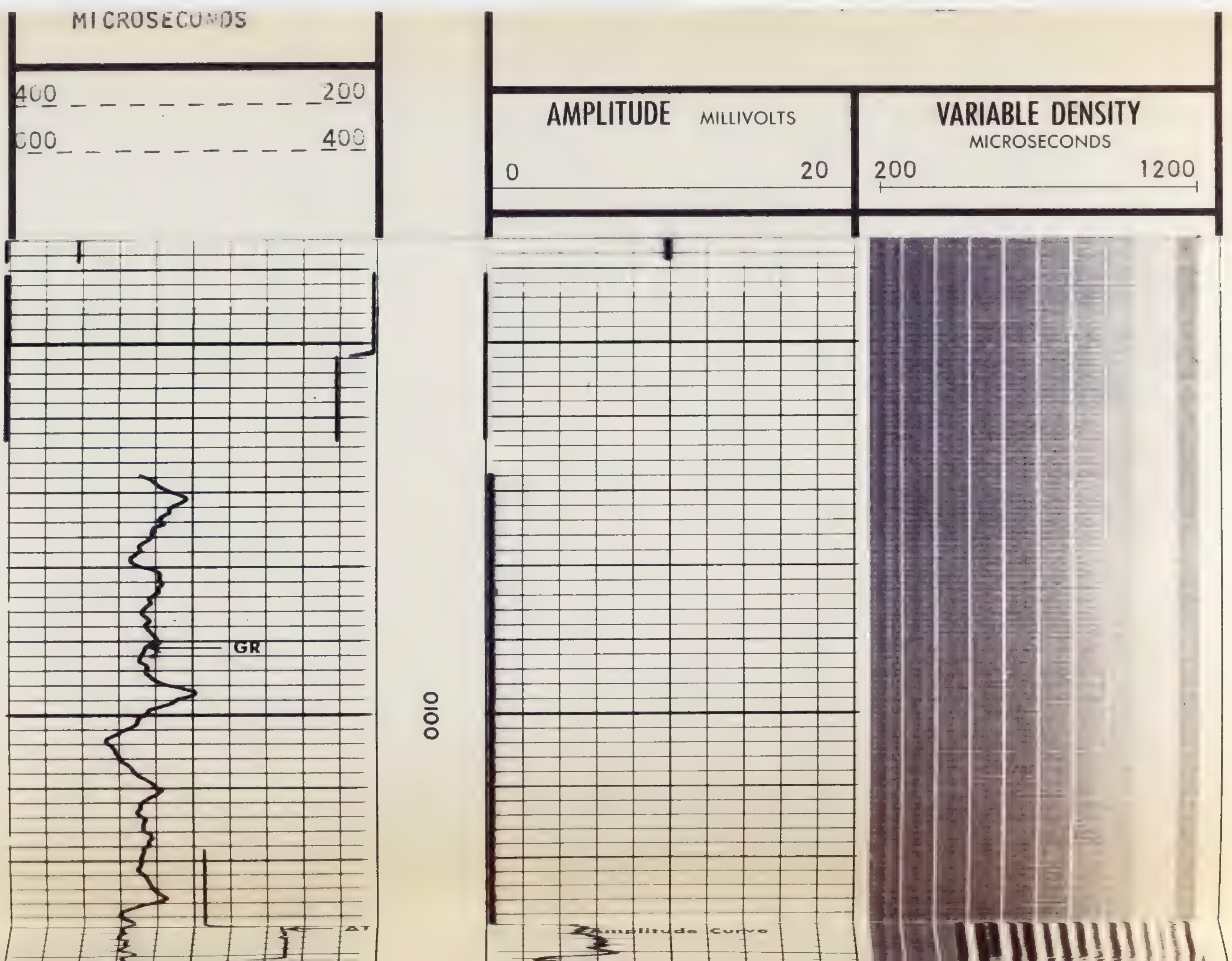
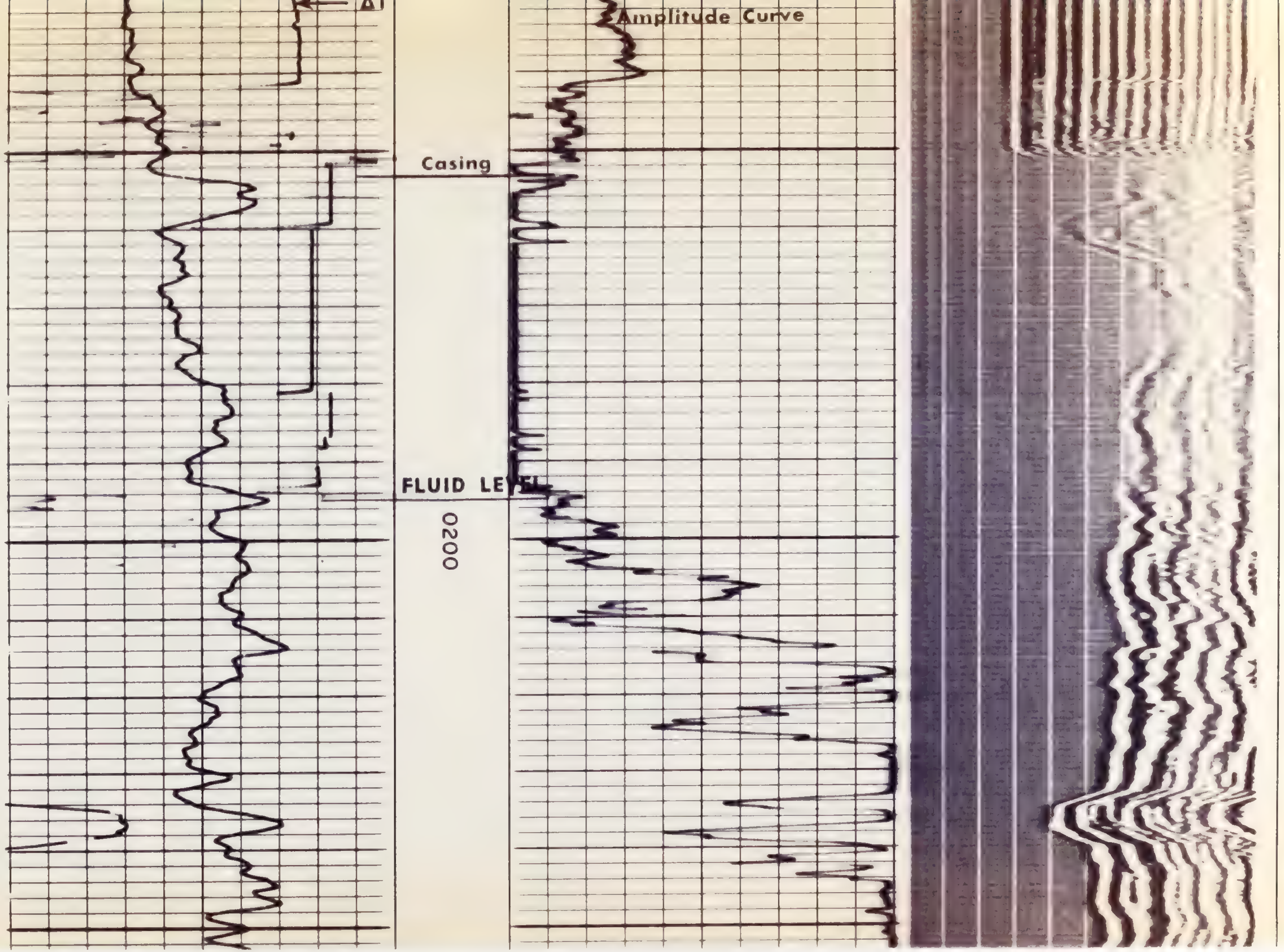
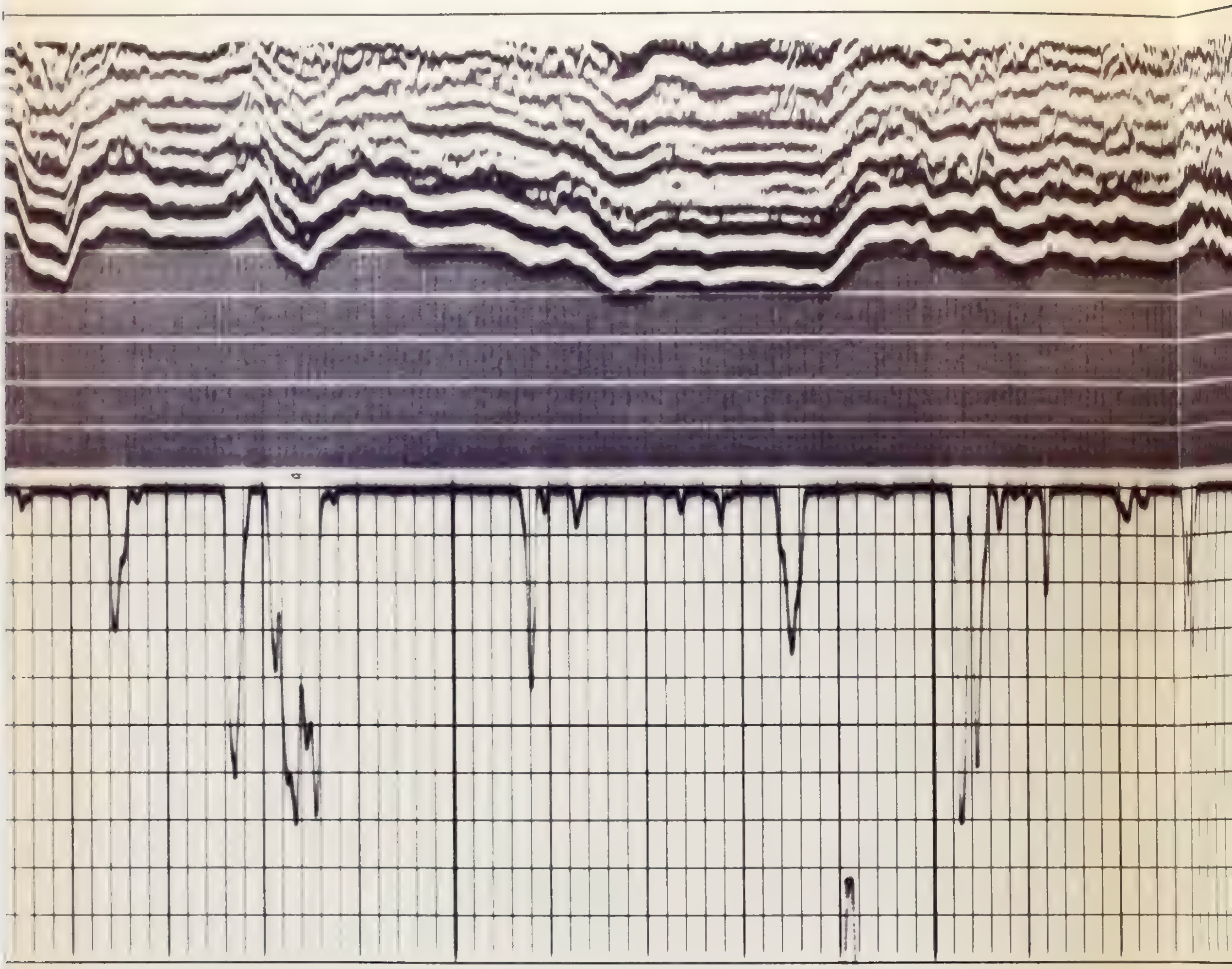


INTERVAL TRANSIT TIME
MICROSECONDS PER FOOT
T 3 R1 2 R2
150
250
100
200
50
150
ΔT FR
1000
DEPTH
GAMMA RAY
API UNITS
0
150
150
300
CALIPER
DIAM. IN INCHES
6
16
GR FR
DELTA-T


MICROSECONDS
400
200
600
400
AMPLITUDE MILLIVOLTS
0
20
VARIABLE DENSITY
MICROSECONDS
200
1200
GR
0100
Amplitude Curve
ΔT


Amplitude Curve
Casing
FLUID LEVEL
0200



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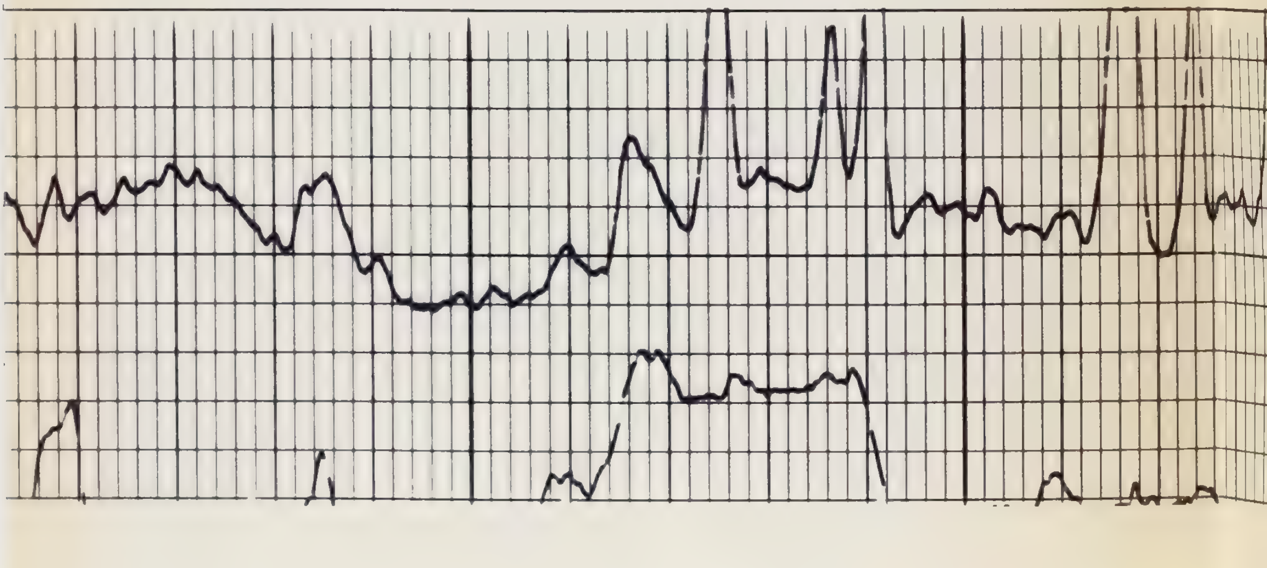

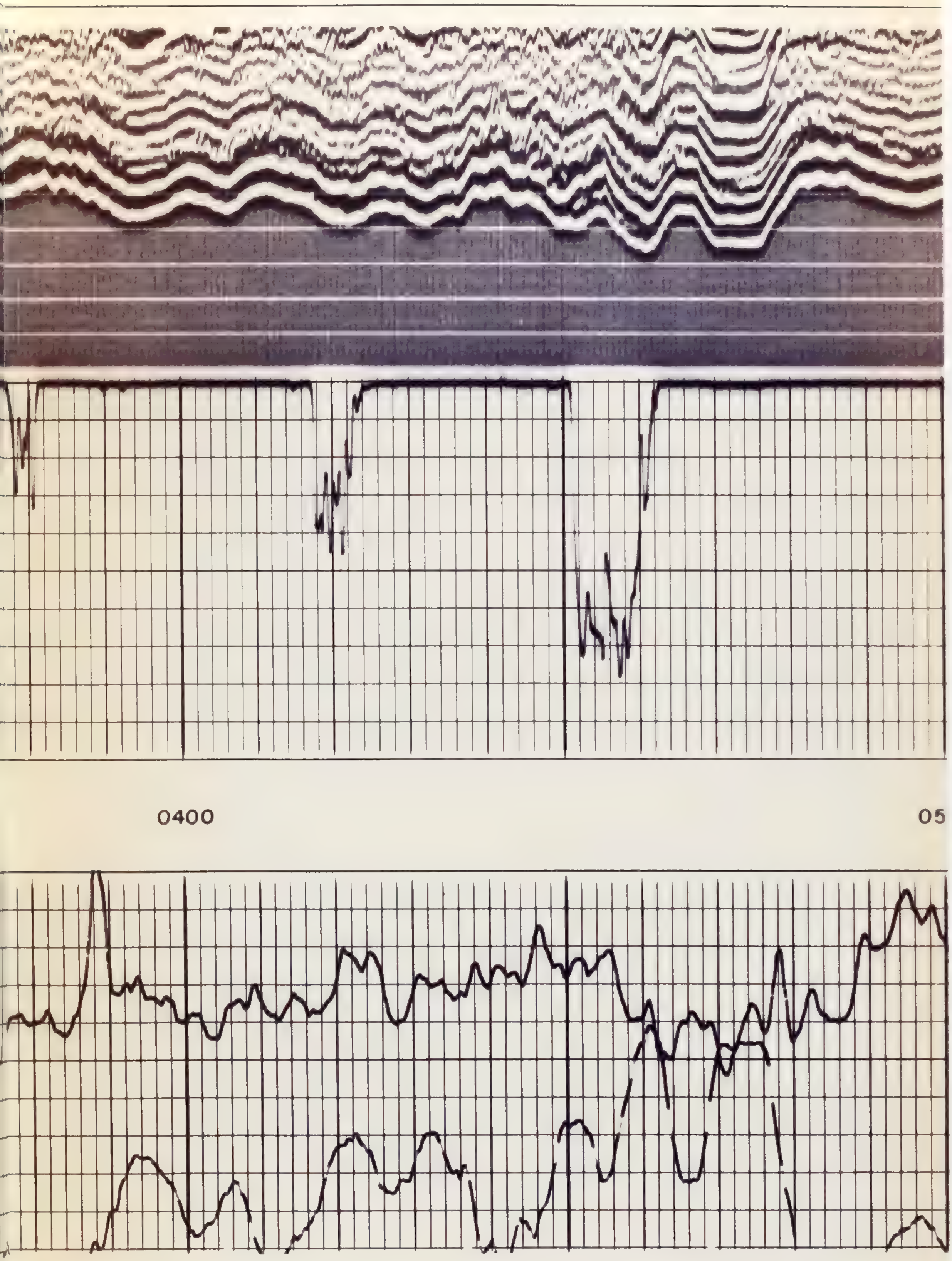
0400
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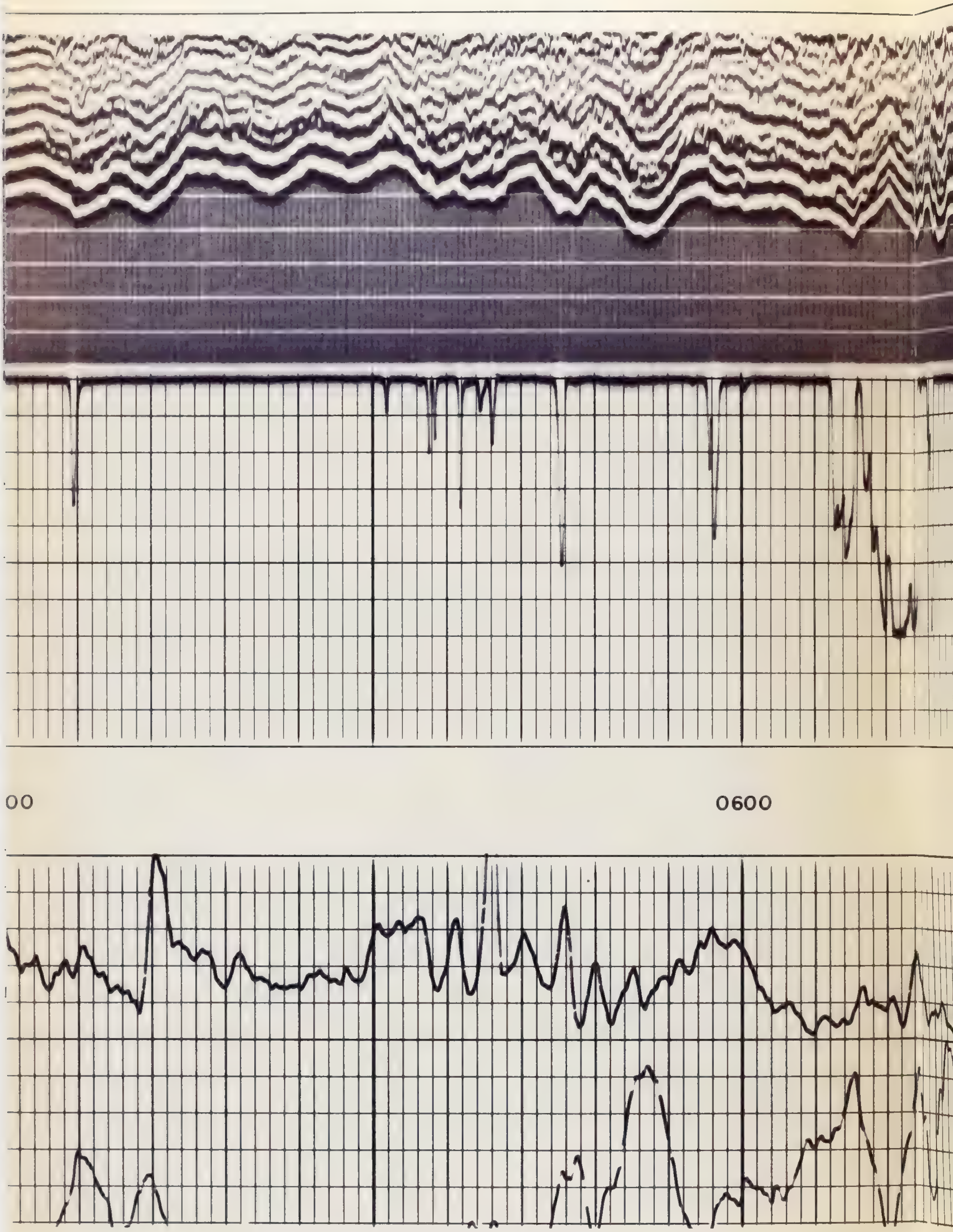
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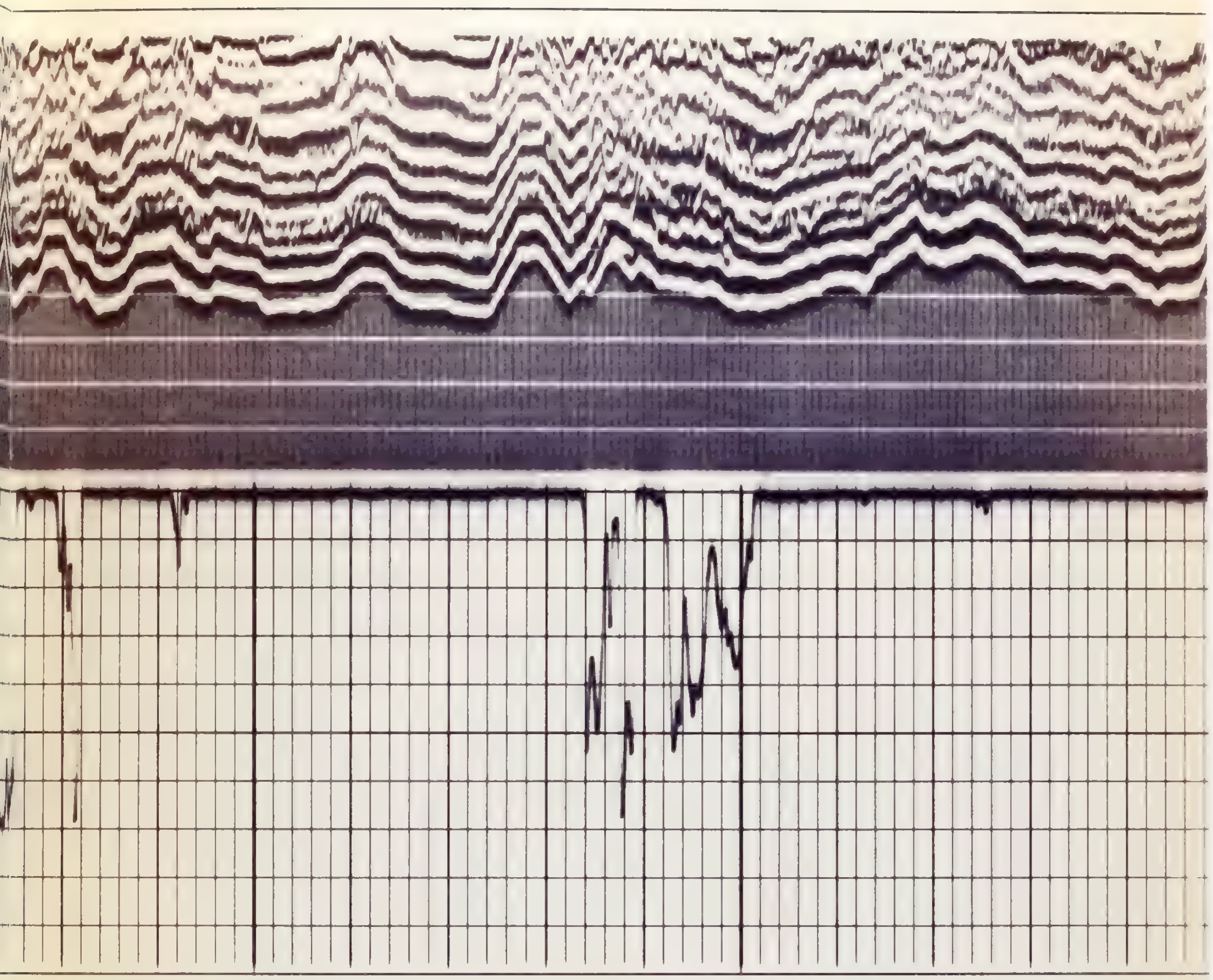
0600



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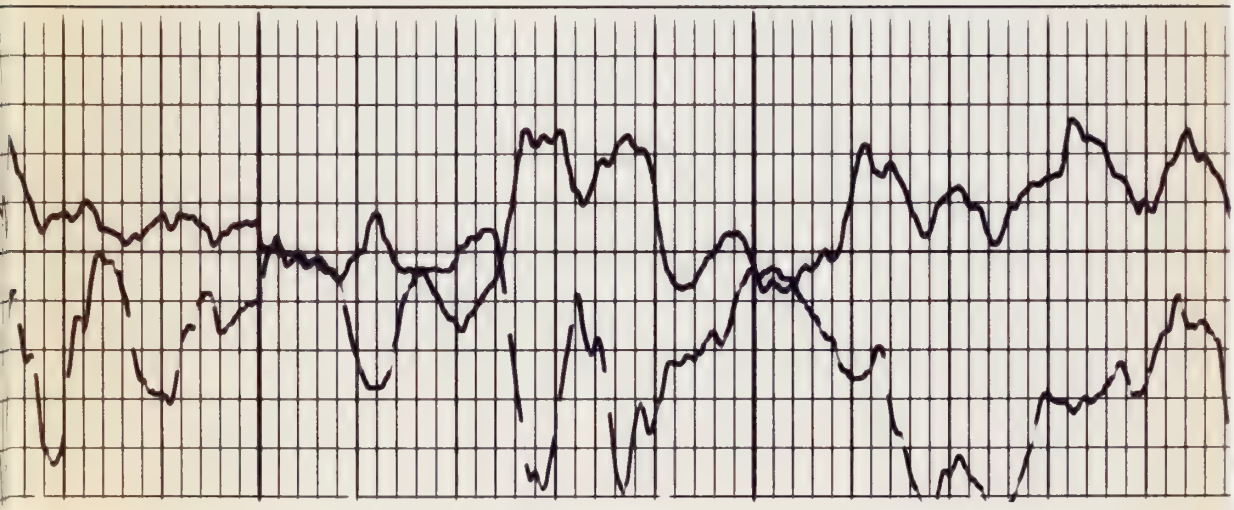

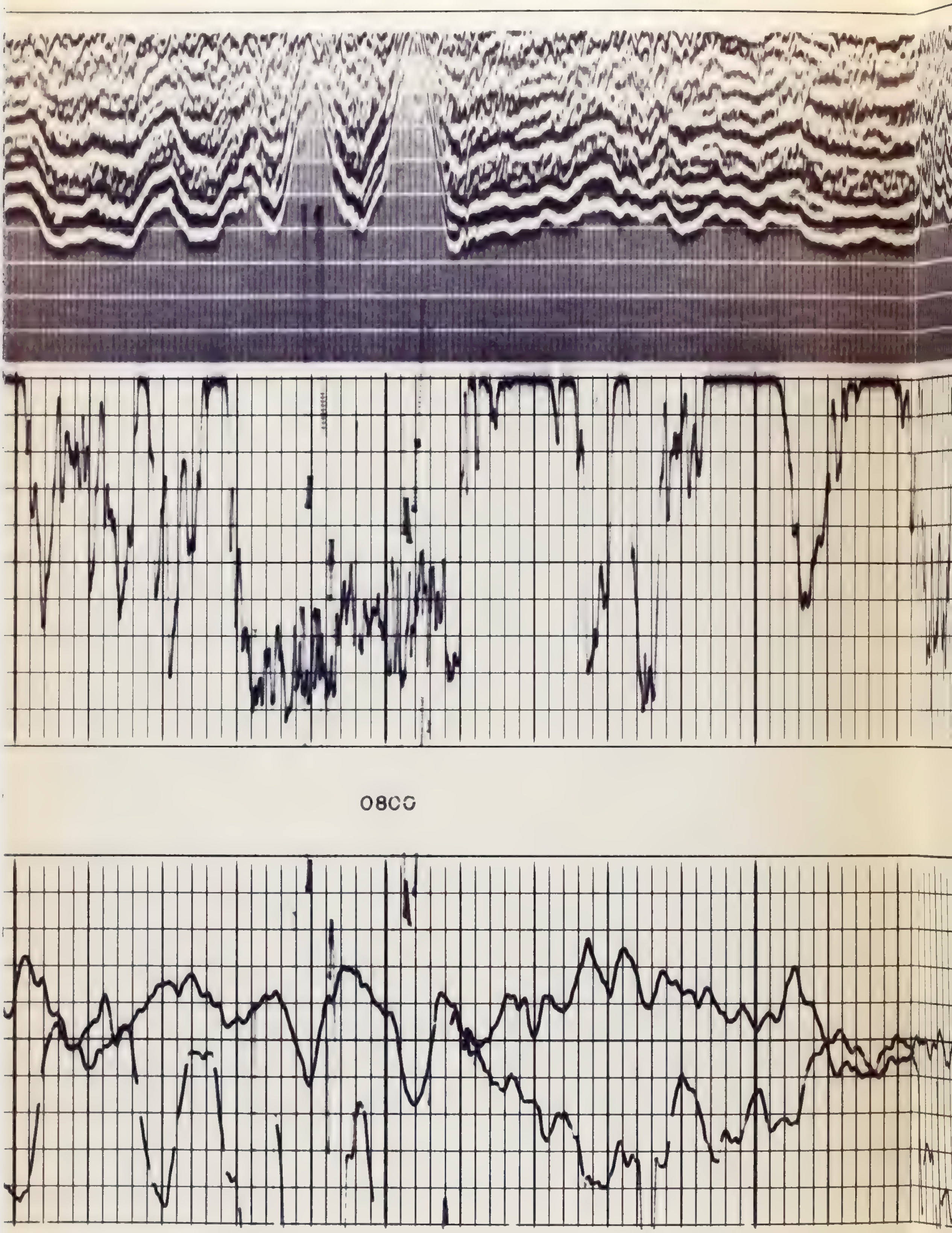
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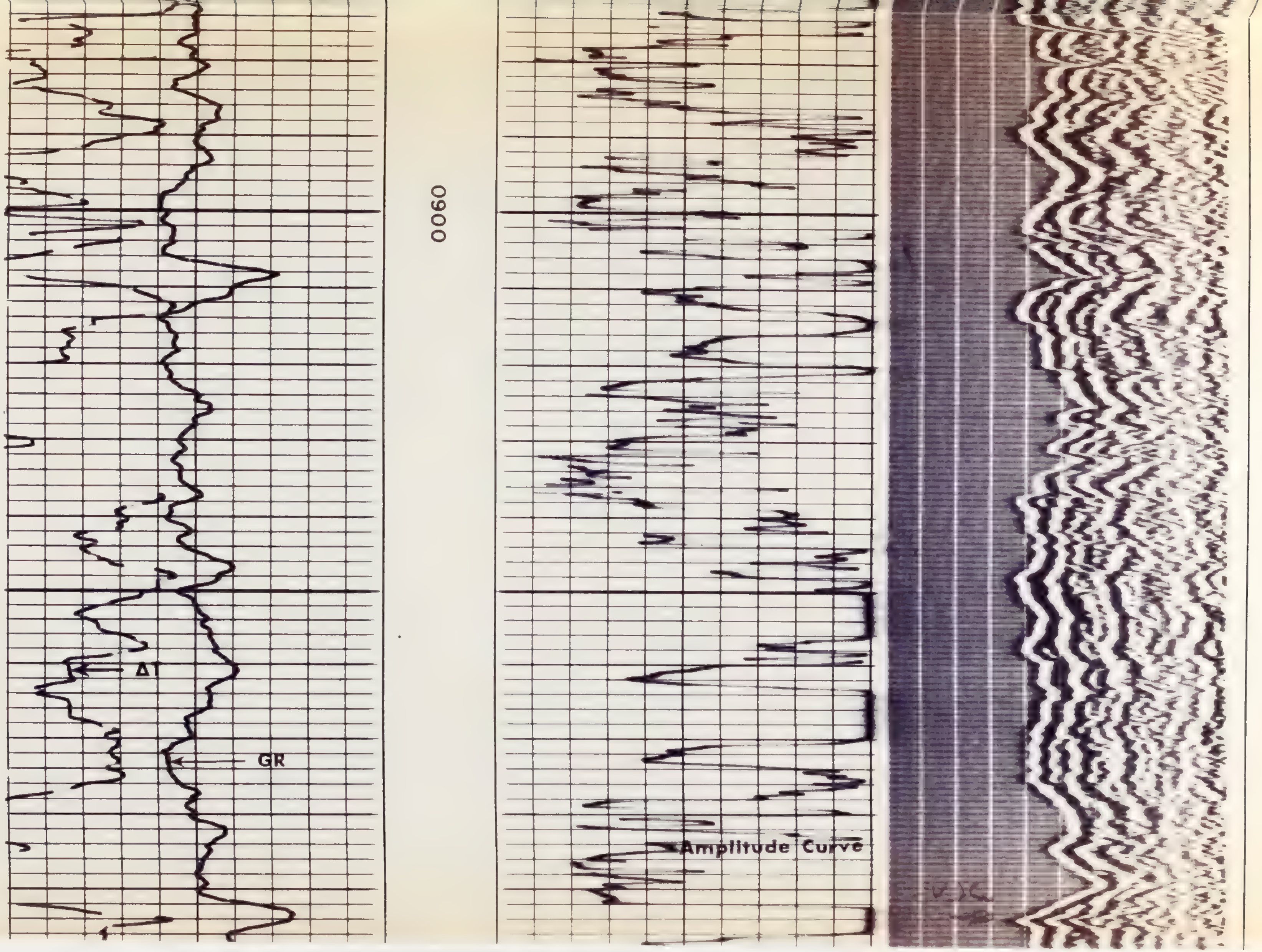
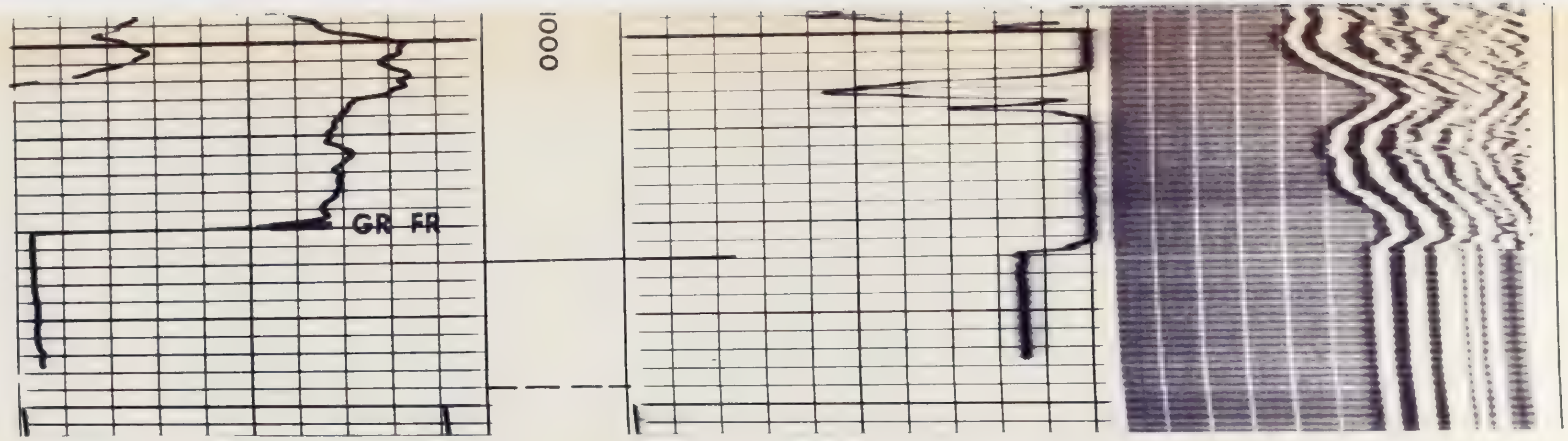
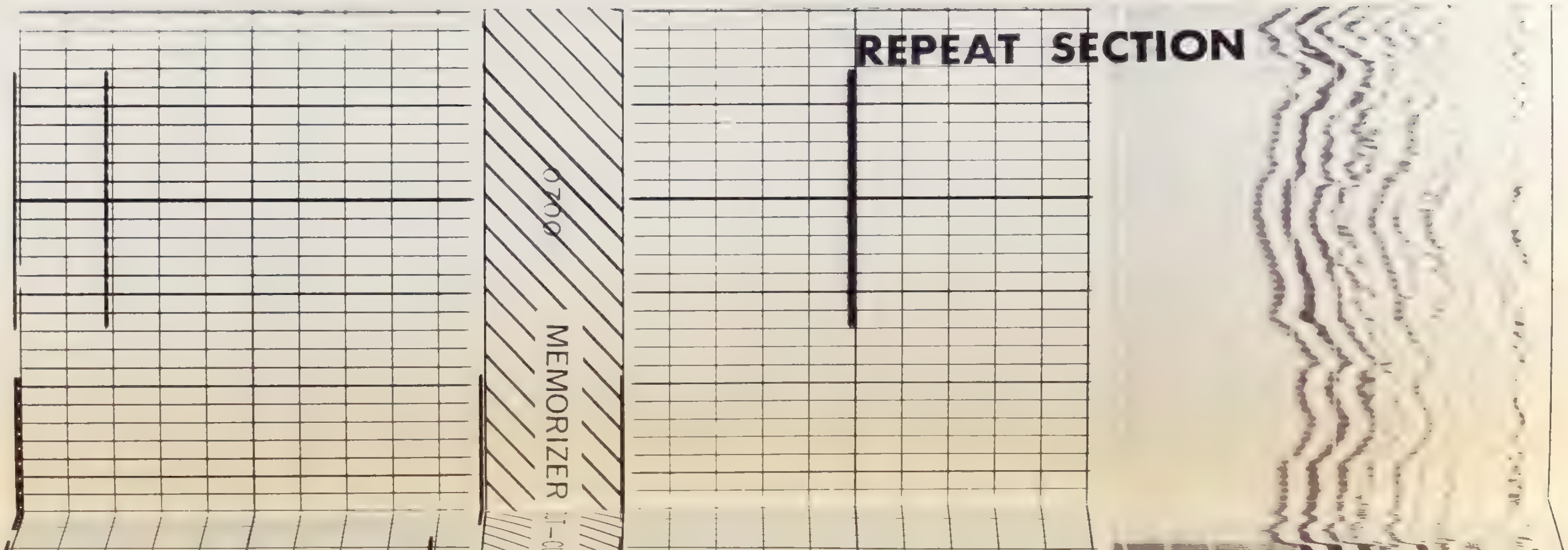
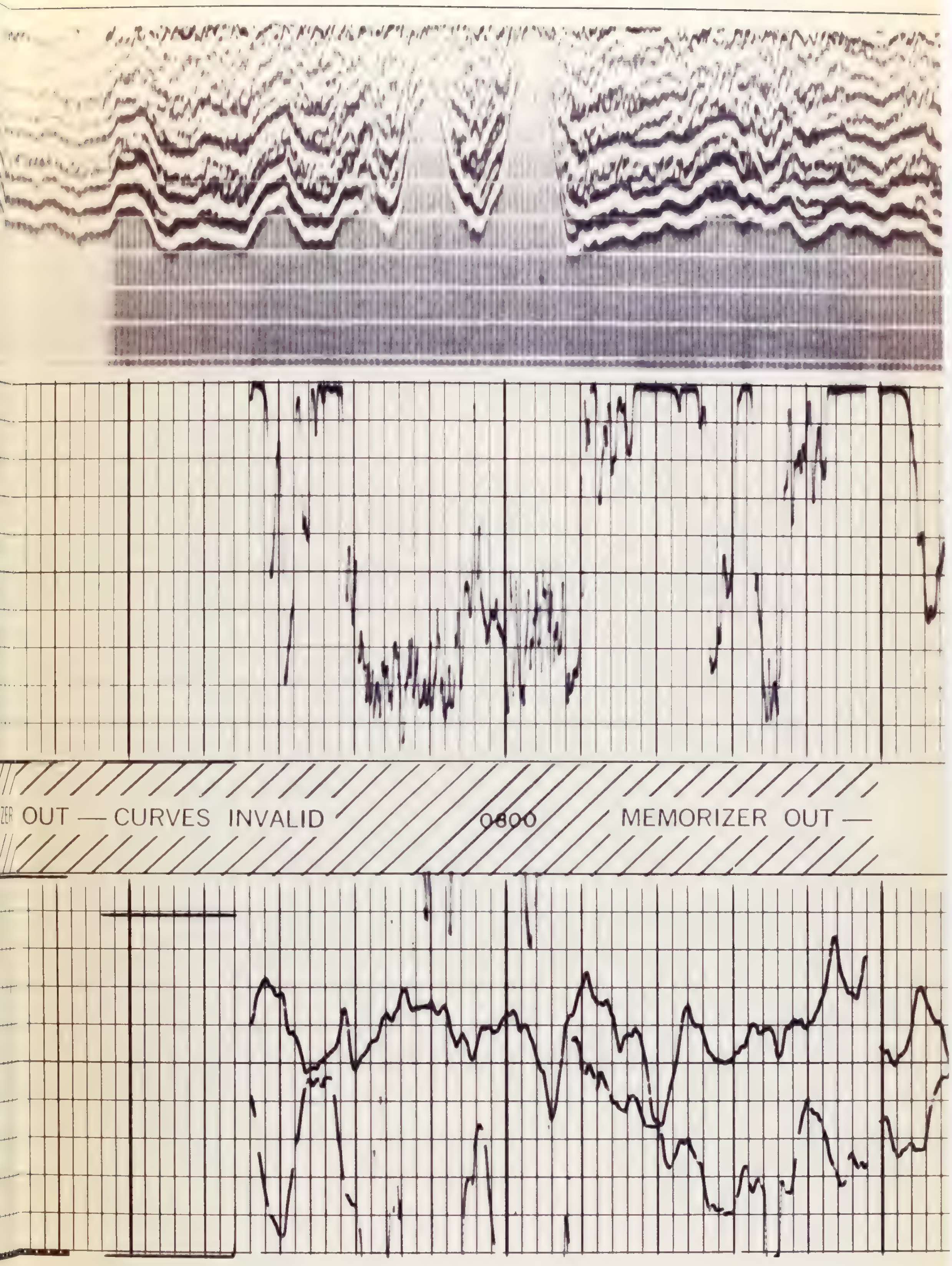
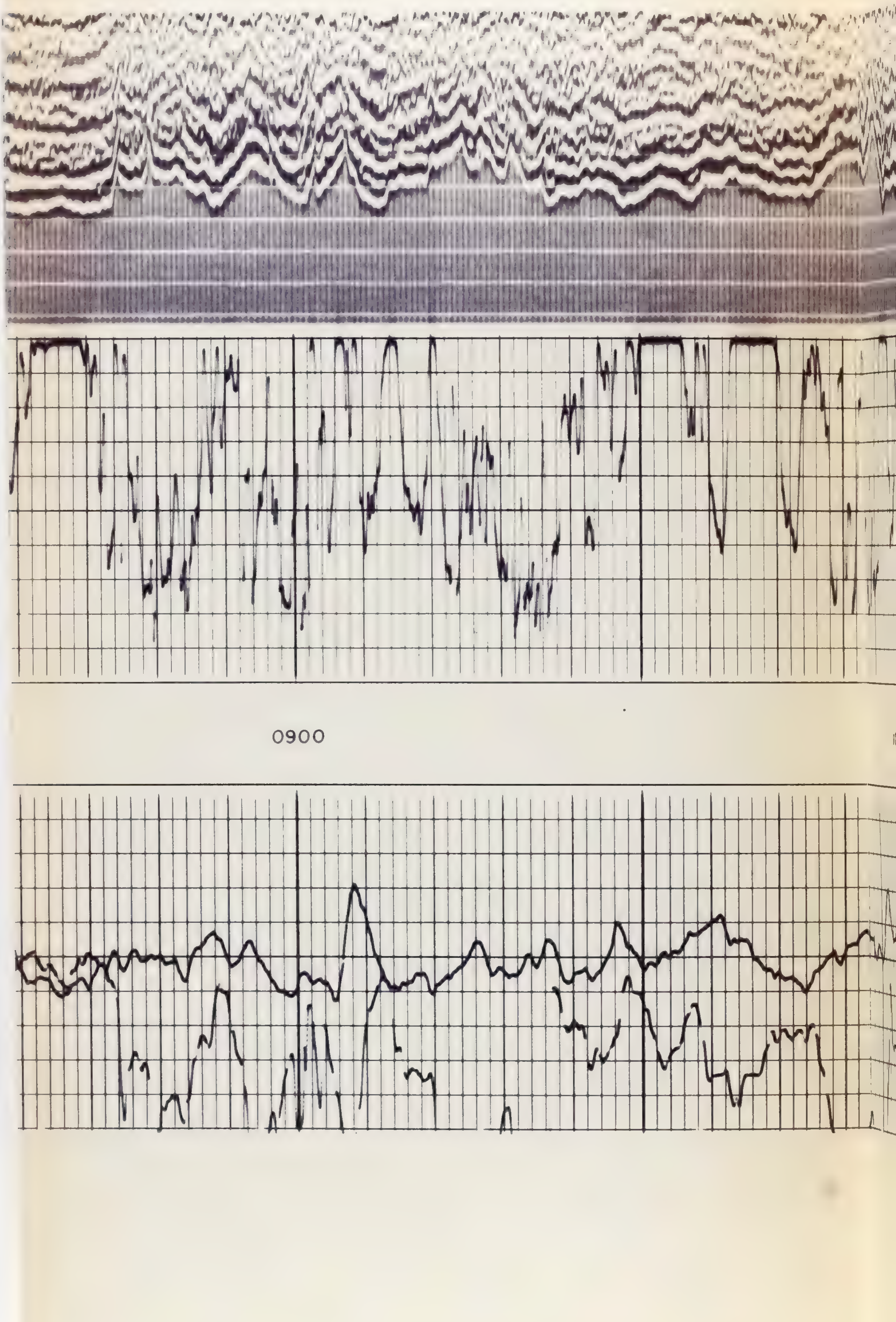

0900
ΔT
GR
Amplitude Curve


1000
GR FR


REPEAT SECTION
0700
MEMORIZER


ZER OUT — CURVES INVALID
0800
MEMORIZER OUT —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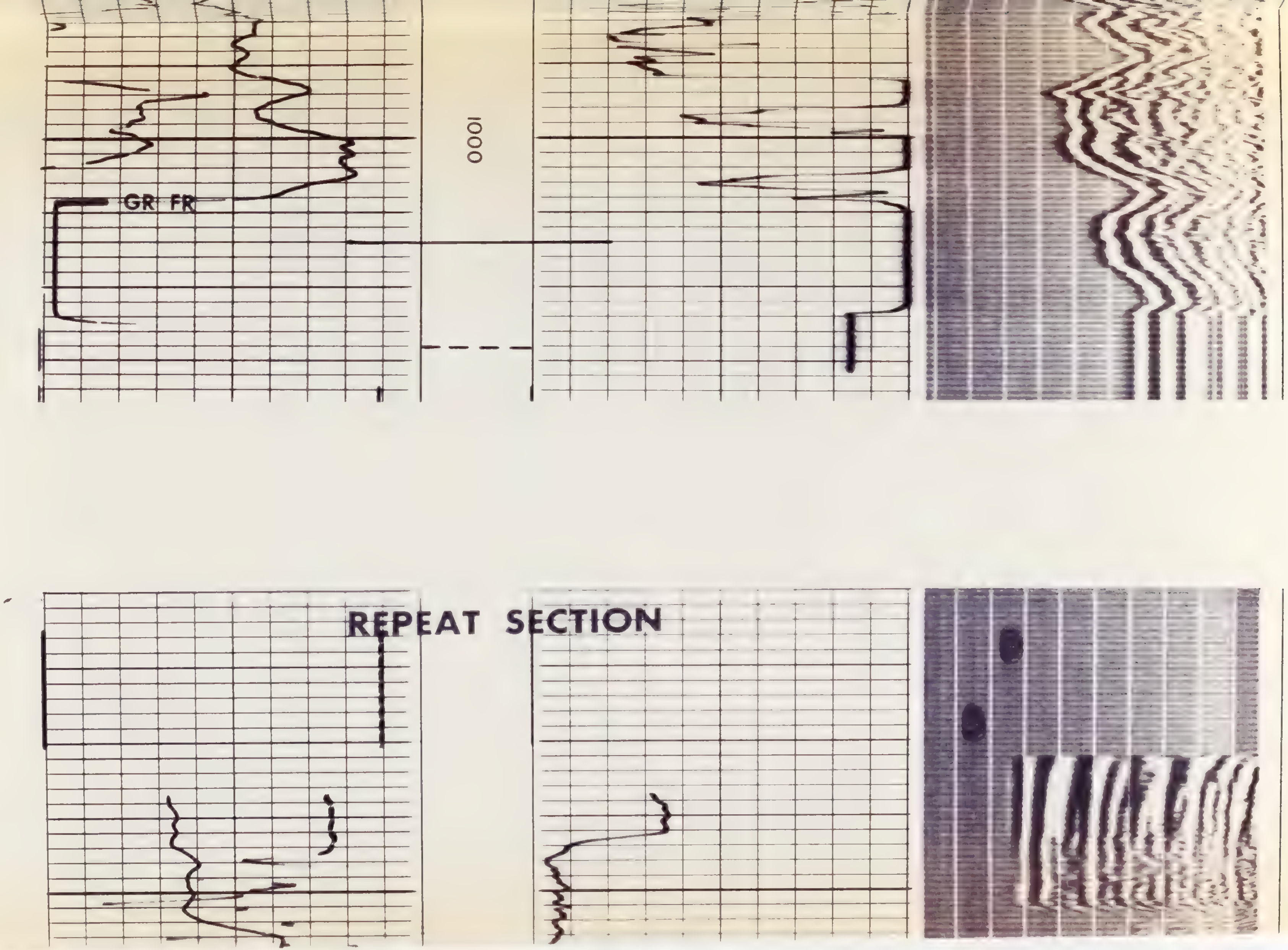
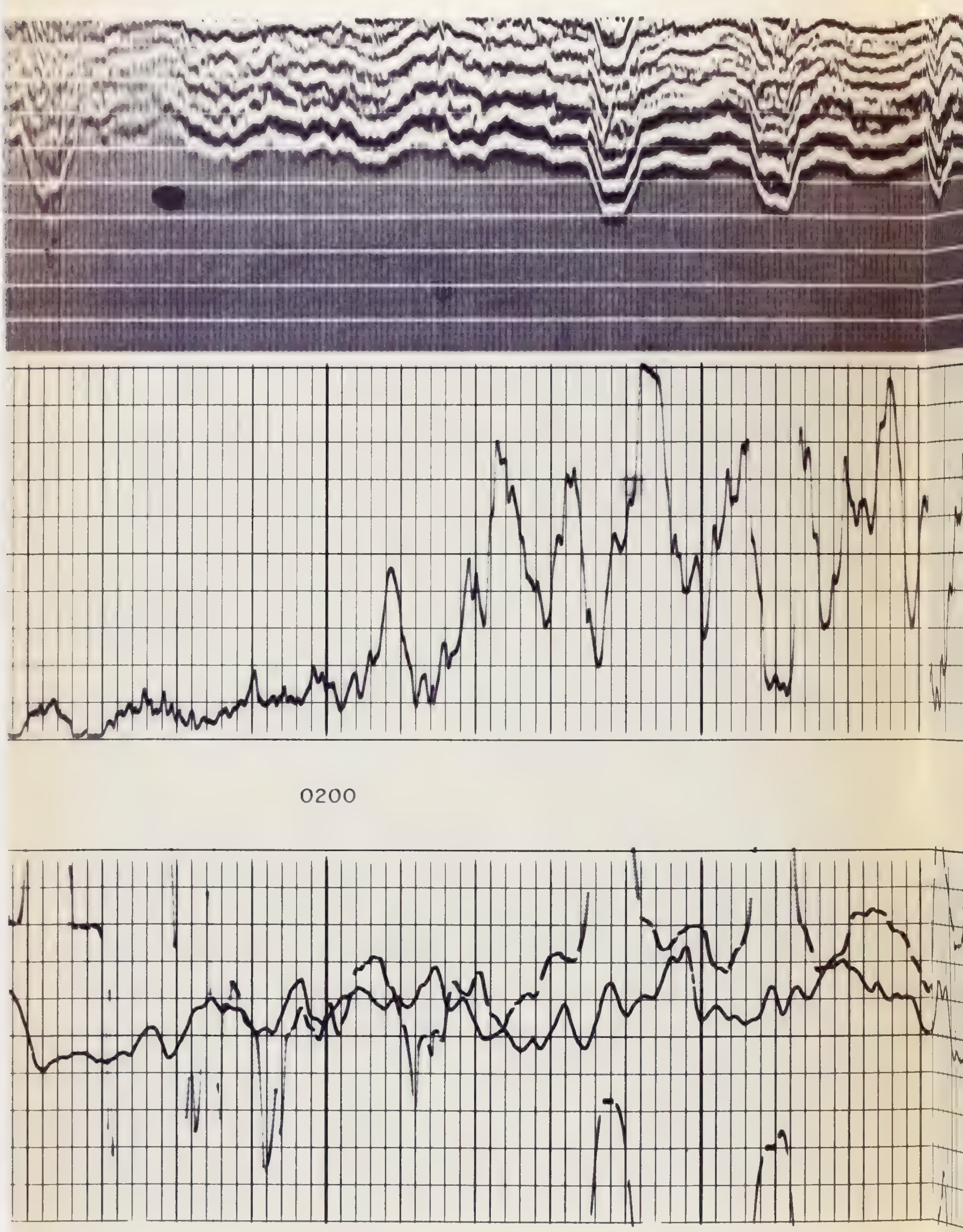

GR FR
1000
REPEAT SECTION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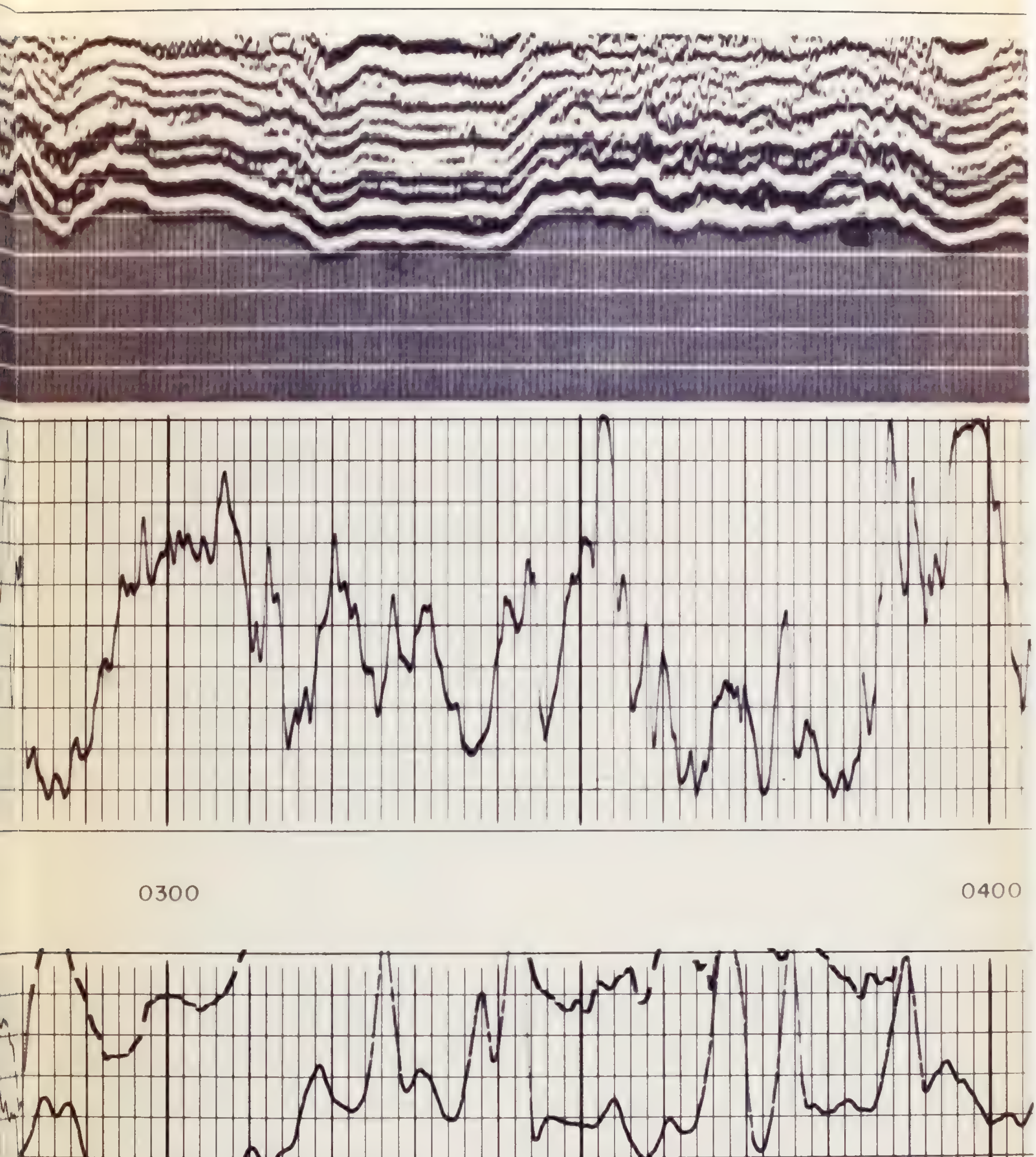
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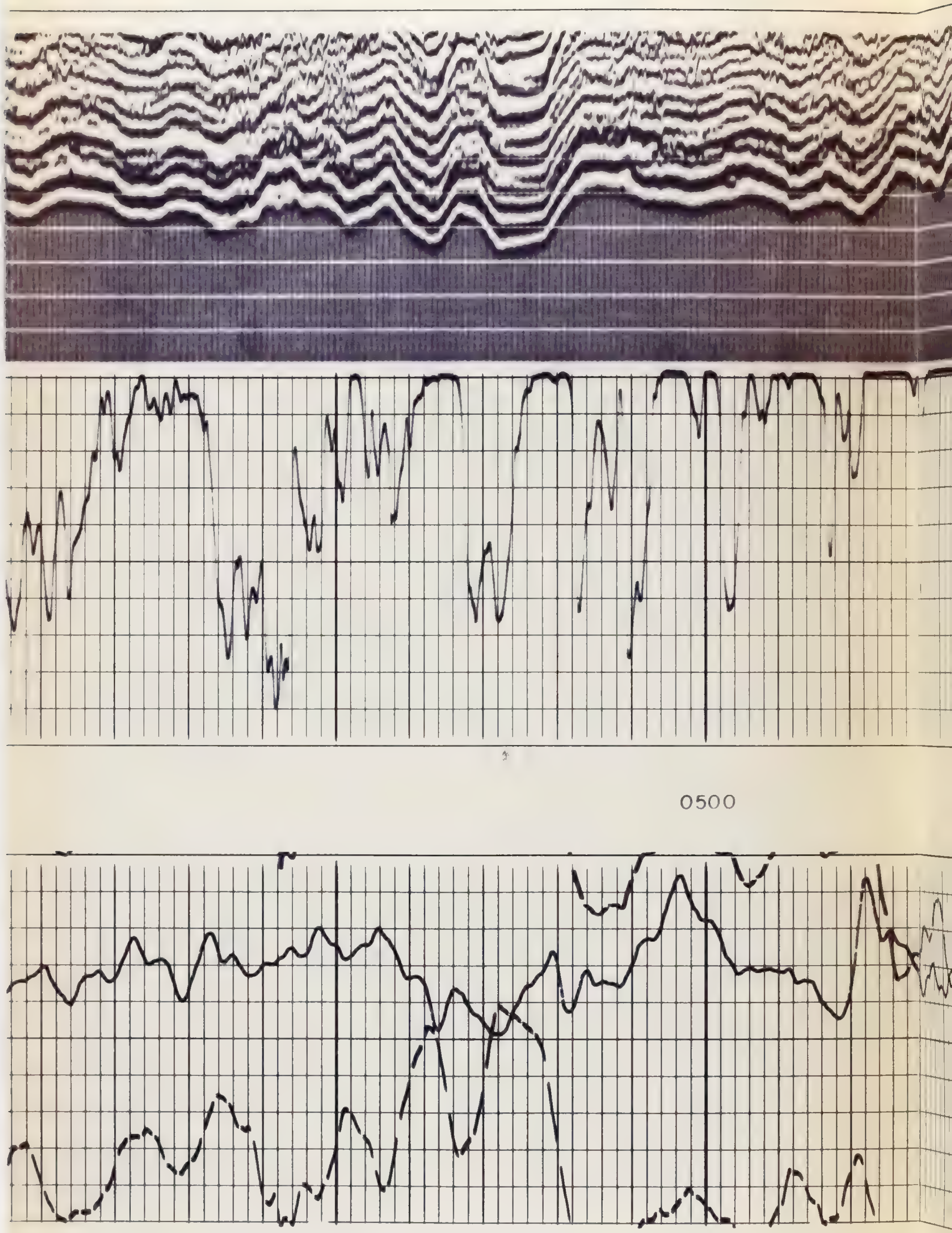
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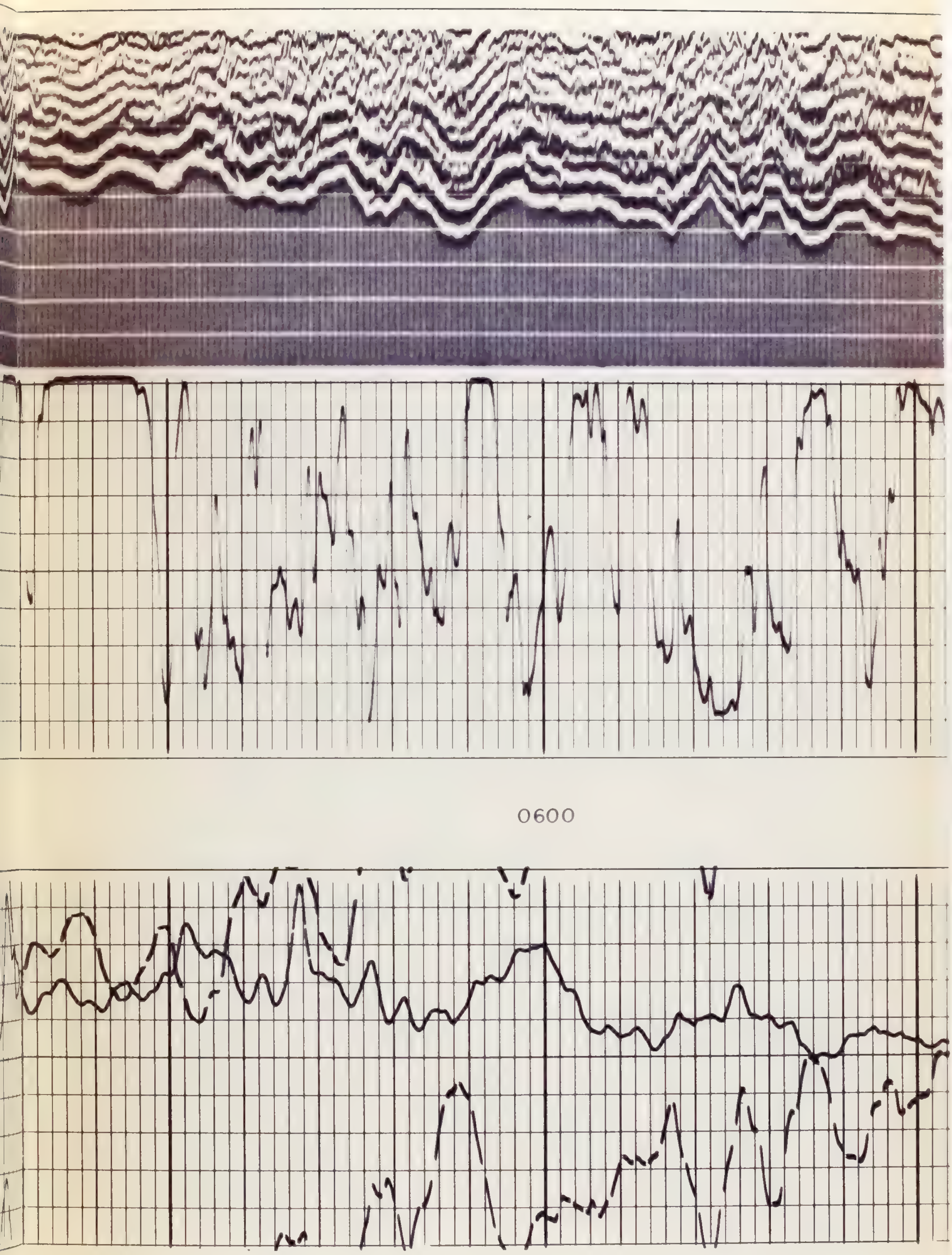
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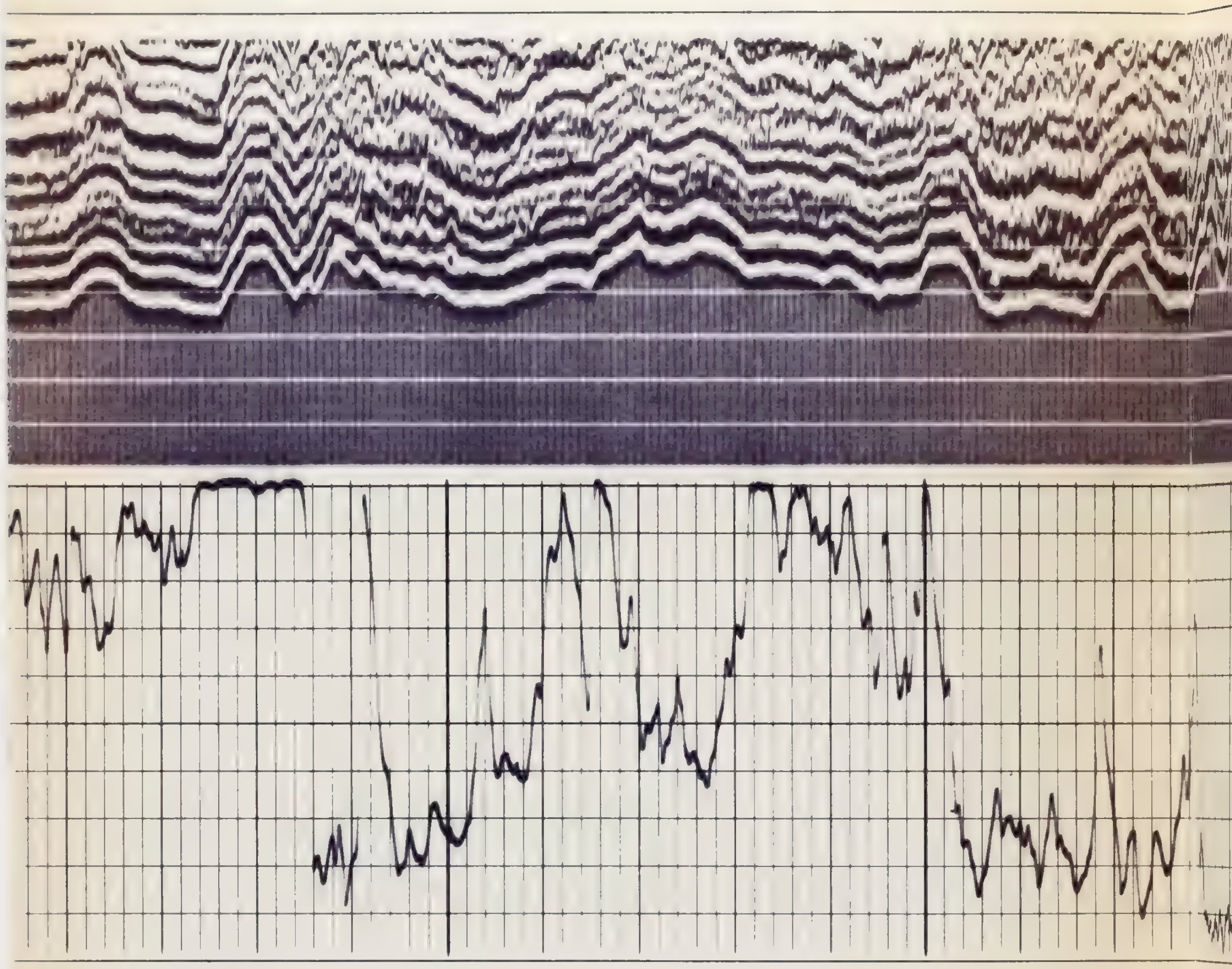

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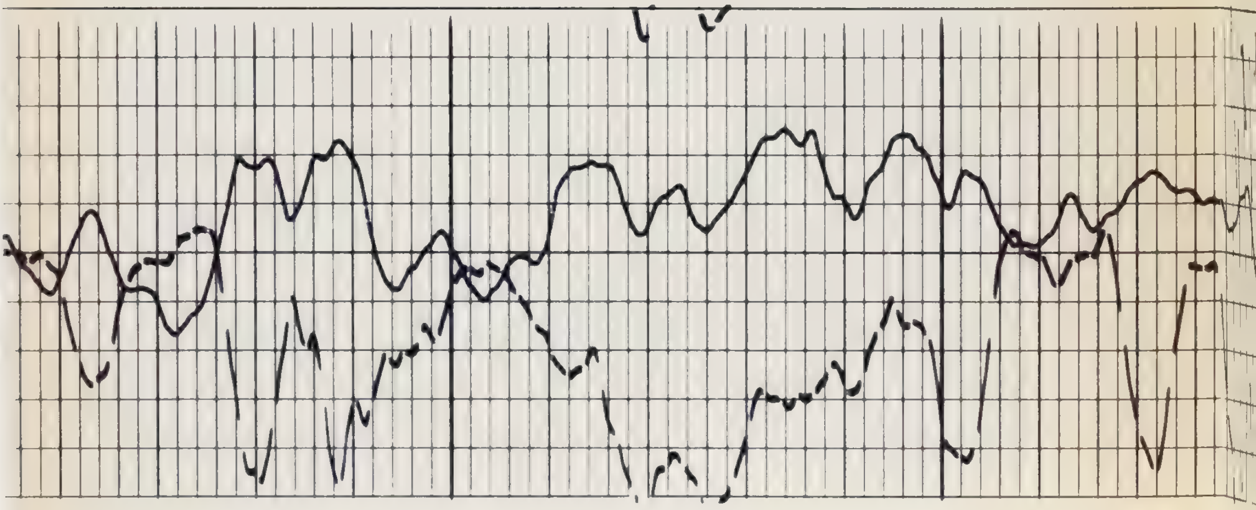

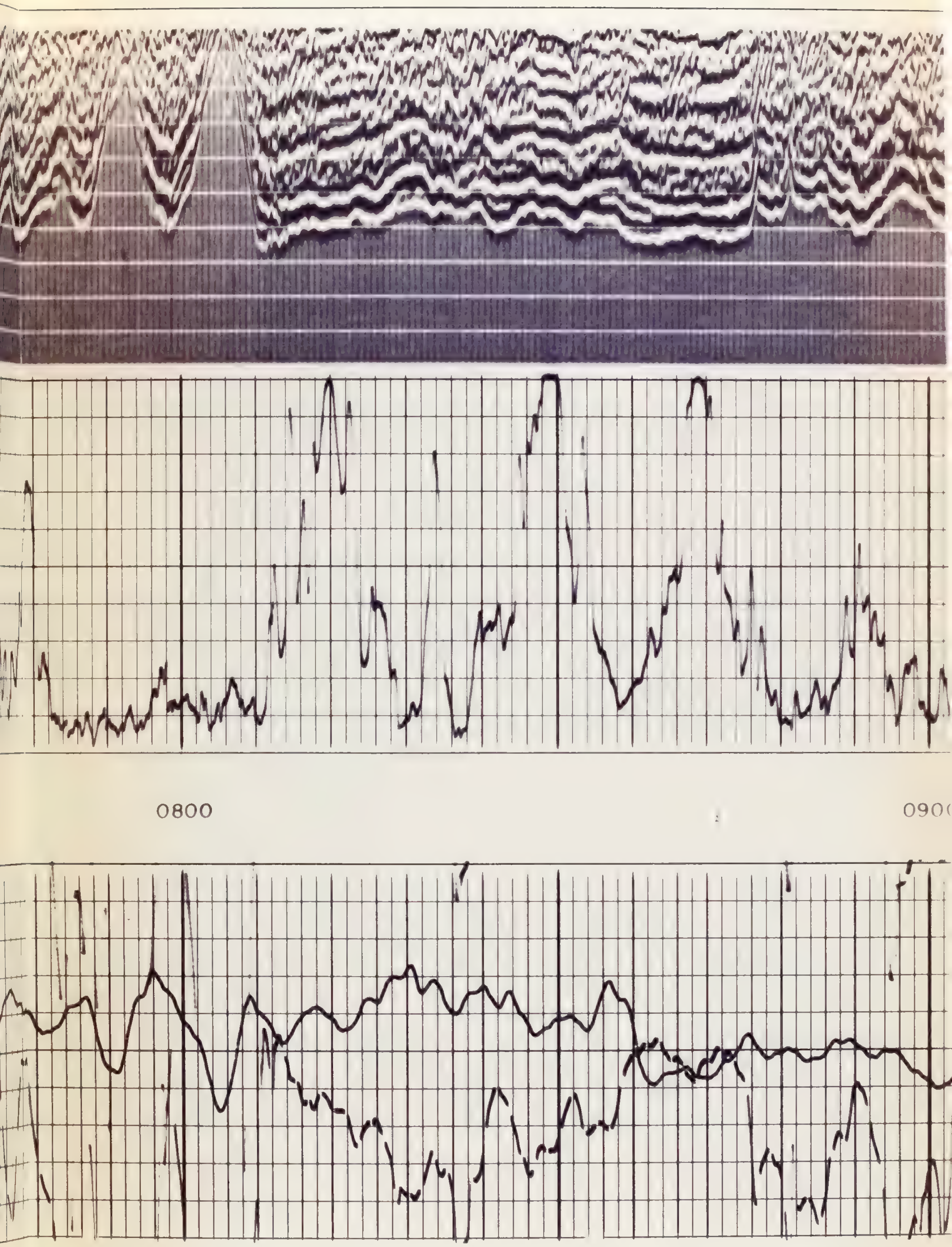
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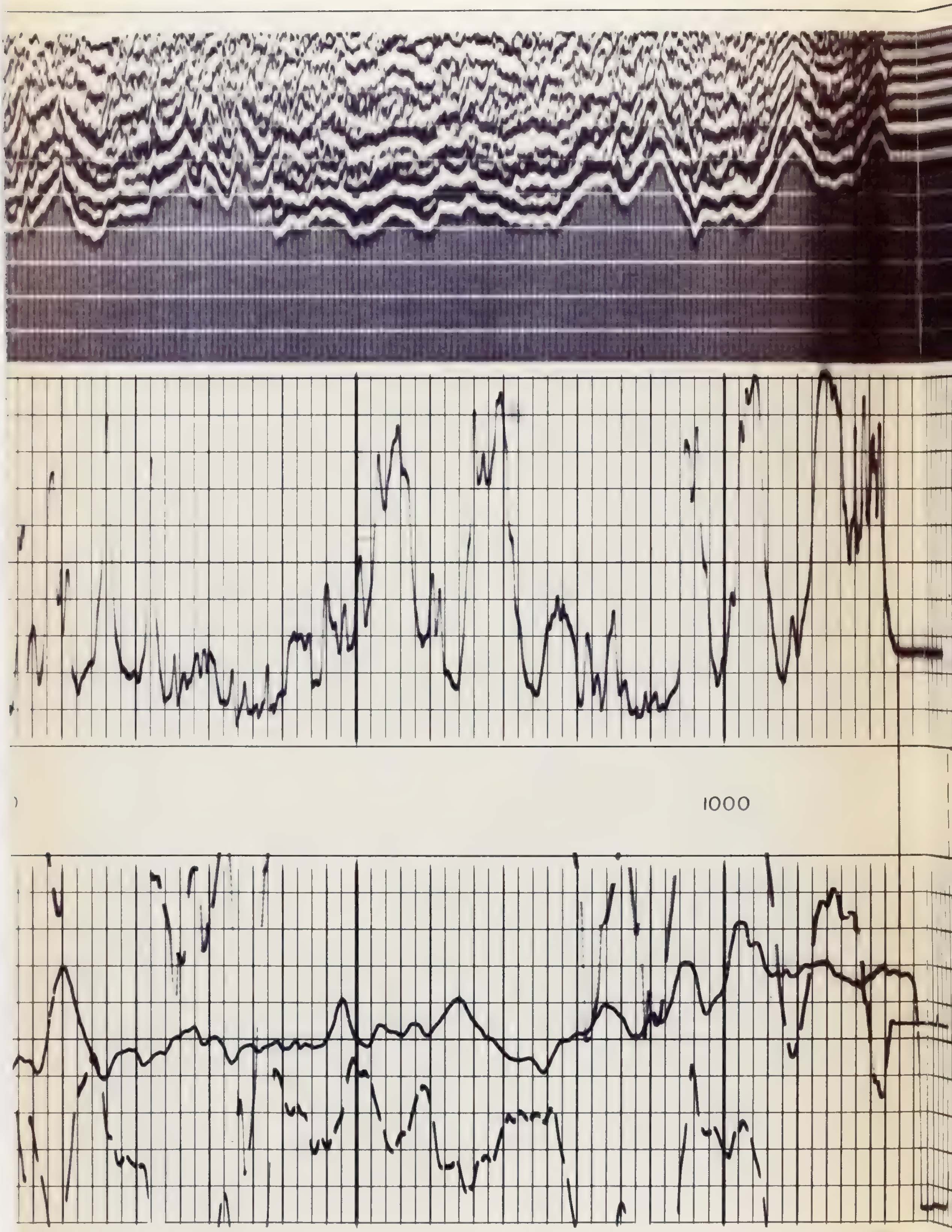
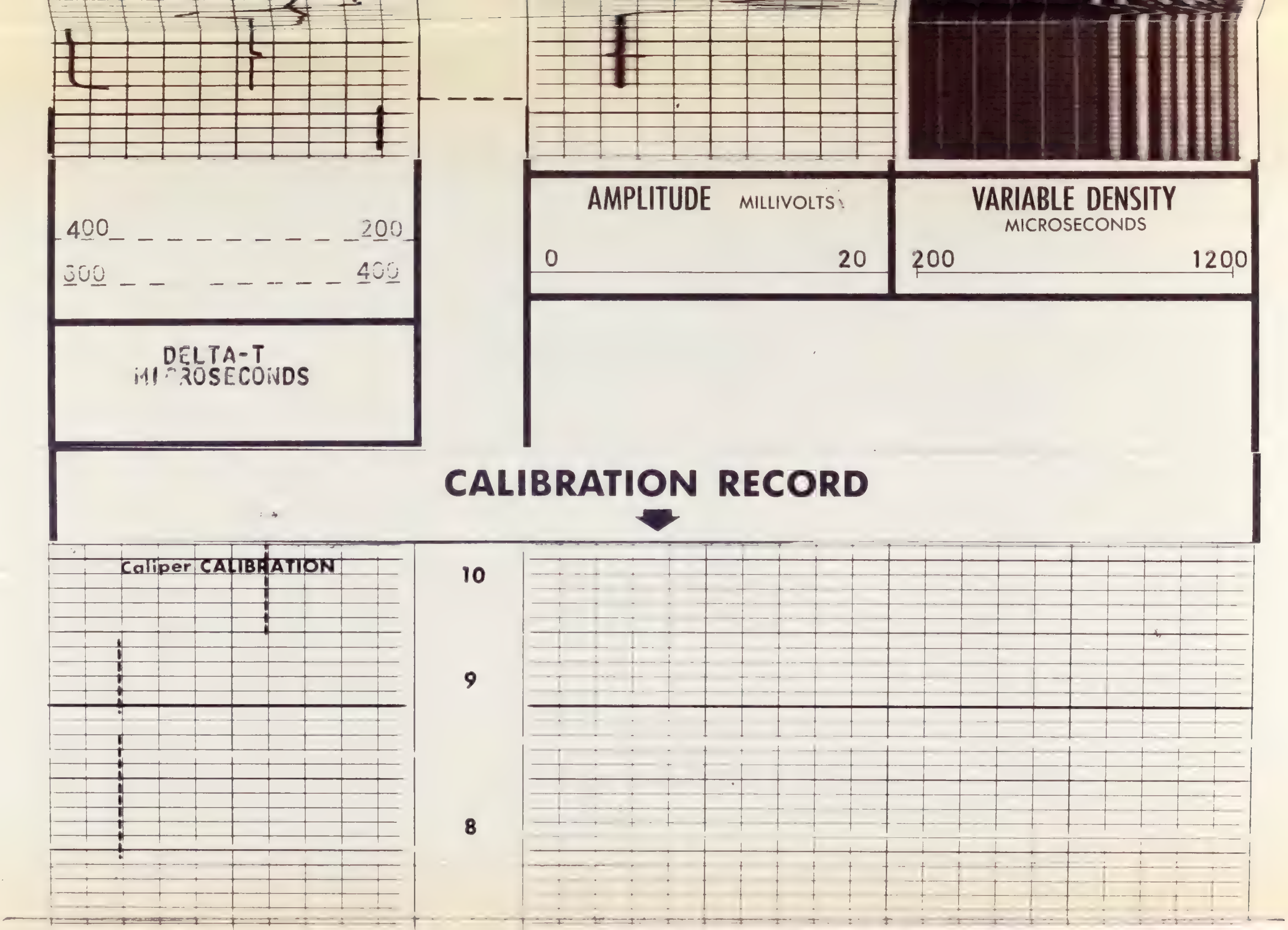
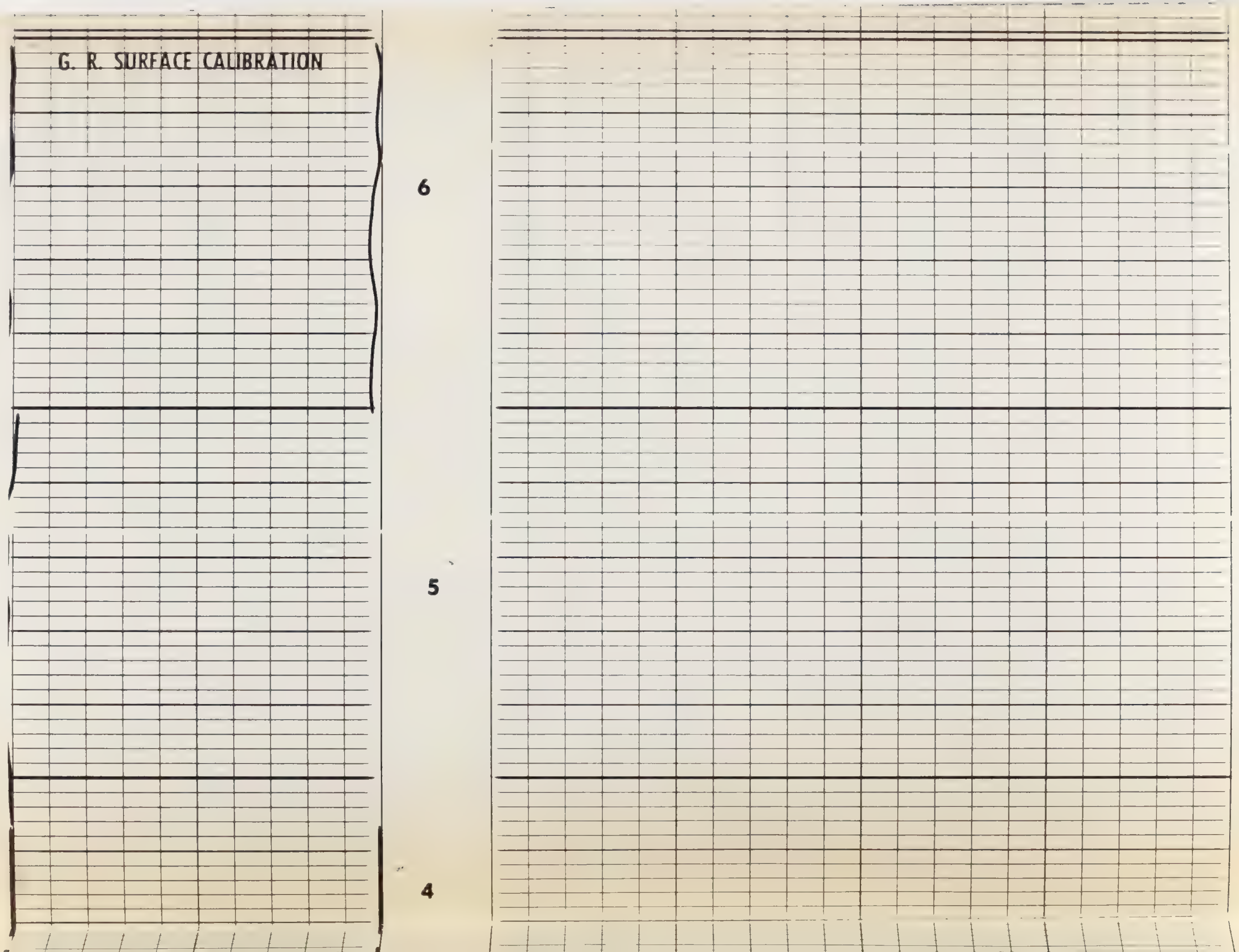
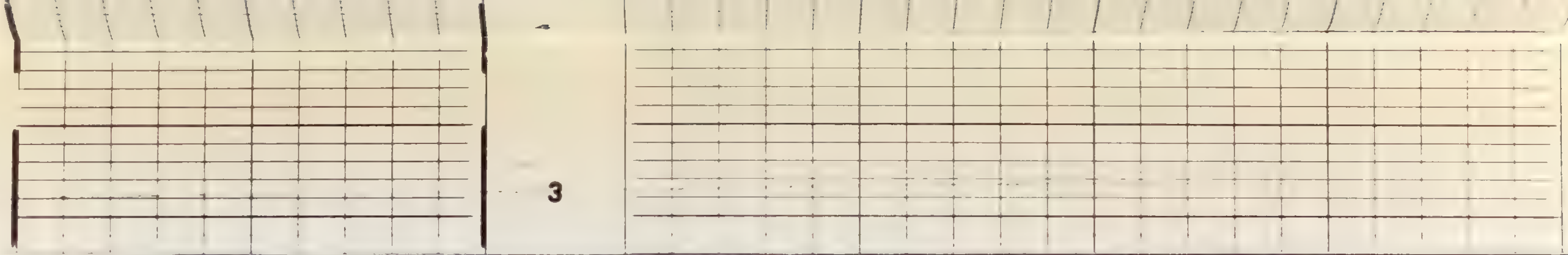

1000


400
200
300
400
DELTA-T
MI^ROSECONDS
AMPLITUDE MILLIVOLTS
0
20
VARIABLE DENSITY
MICROSECONDS
200
1200
CALIBRATION RECORD
Caliper CALIBRATION
10
9
8


G. R. SURFACE CALIBRATION
6
5
4



CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

SCHL. FR 1034

SCHL. TD 1037

DRLR TD 1036

Elev: KB 6819

DF 6818

GL 6811

SG-21

Schlumberger

DUAL LATEROLOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
LOCATION
WELL S. G. NO. 21
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD CO.

WELL S. G. NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION
2101.6 FSL& 1528.6 FEL
Sec. 13 Twp. 3S Rge. 97W

Other Servic
DLL
FDC
BHC

Permanent Datum: GL, Elev. 6811
Log Measured From GL 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B.6
D.F.6
G.L.6

Date	1/7/75			
Run No.	ONE			
Depth—Driller	1036			
Depth—Logger	1036			
Btm. Log Interval	1020			
Top Log Interval	155			
Casing—Driller	8 5/8@ 140	@	@	
Casing—Logger	155			
Bit Size	7 7/8			
Type Fluid in Hole	WATER			
Dens. Visc.				
pH Fluid Loss	ml	ml	ml	
Source of Sample	MUDPIT			
R_m @ Meas. Temp.	14.7 @ 69 °F	@ °F	@ °F	
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	
Source: R_{mf} R_{mc}	CLEAR WATER			
R_m @ BHT	14.7 @ 70 °F	@ °F	@ °F	
Time Since Circ.	17 HOURS			
Max. Rec. Temp.	70 °F	°F	°F	
Equip. Location	5602 G.J.			
Recorded By	BARGHOUTI			
Witnessed By	BURNS			

SWS 1974-B

°F °F °F °F °F ml

319
318
311

es:

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.				
Depth - Driller					
Type Fluid in Hole					
Dens.	Visc.				
ph	Fluid Loss		ml		ml
Source of Sample					
R_m @ Meas. Temp.		@	°F	@	°F
R_{mf} @ Meas. Temp.		@	°F	@	°F
R_{mc} @ Meas. Temp.		@	°F	@	°F
Source: R_{mf}	R_{mc}				
R_m @ BHT		@	°F	@	°F
R_{mf} @ BHT		@	°F	@	°F
R_{mc} @ BHT		@	°F	@	°F

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

EQUIPMENT DATA

Run No.	ONE			
Panel No.	894-850			
Cart. No.	845			
Sonde No.	848			
Mem. Panel No.				
G.R. Cart. No.				
G.R. Panel No.				
TTR No.				
Speed-F.P.M.				
BEEM WIDTH:	8"			
GUARD LENGTH 5'				

REMARKS

Service Order No. -

API Serial No. -

CALIBRATION DATA

CALIBRATION DATA

CALIBRATION:	BACKGND. CPS.	SOURCE CPS.	GALV. INCR. DIVISION	SENS. TAP (FOR CAL.)	SENS. TAP (RECORD)	TIME CONST.	
GAMMA RAY:							

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DEPTHS

RESISTIVITY

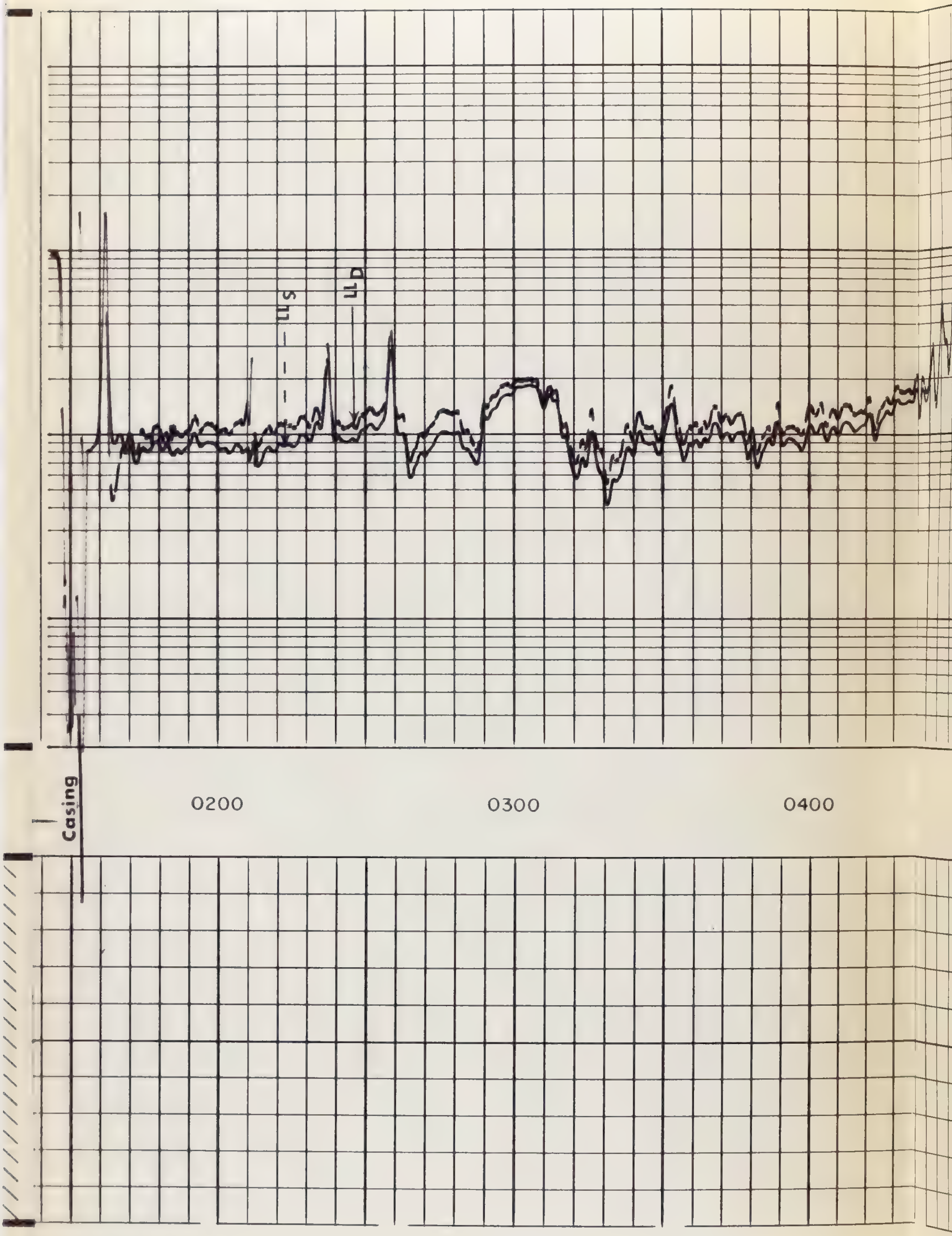
OHMS. M^2 M

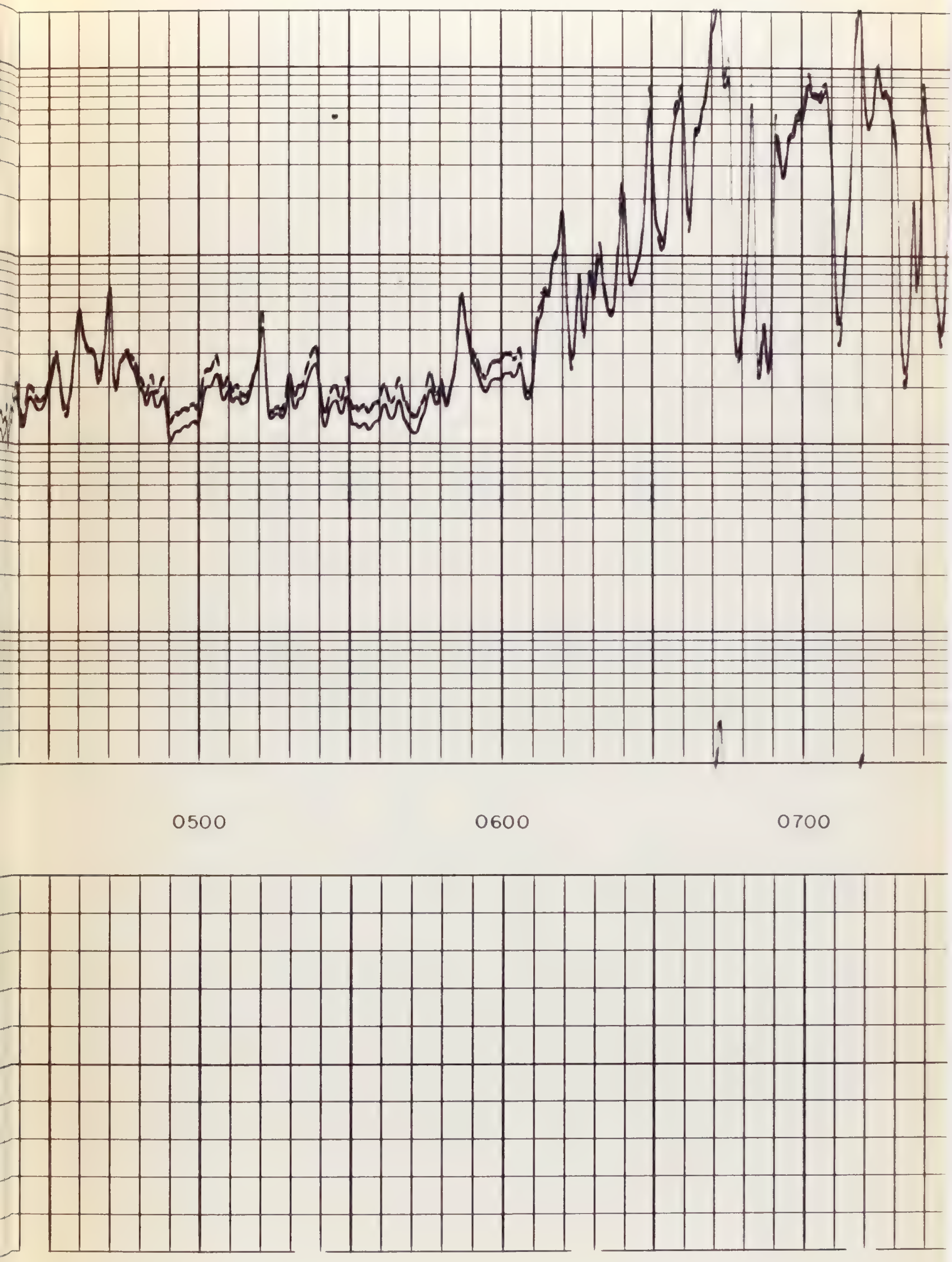
DEEP LATEROLOG

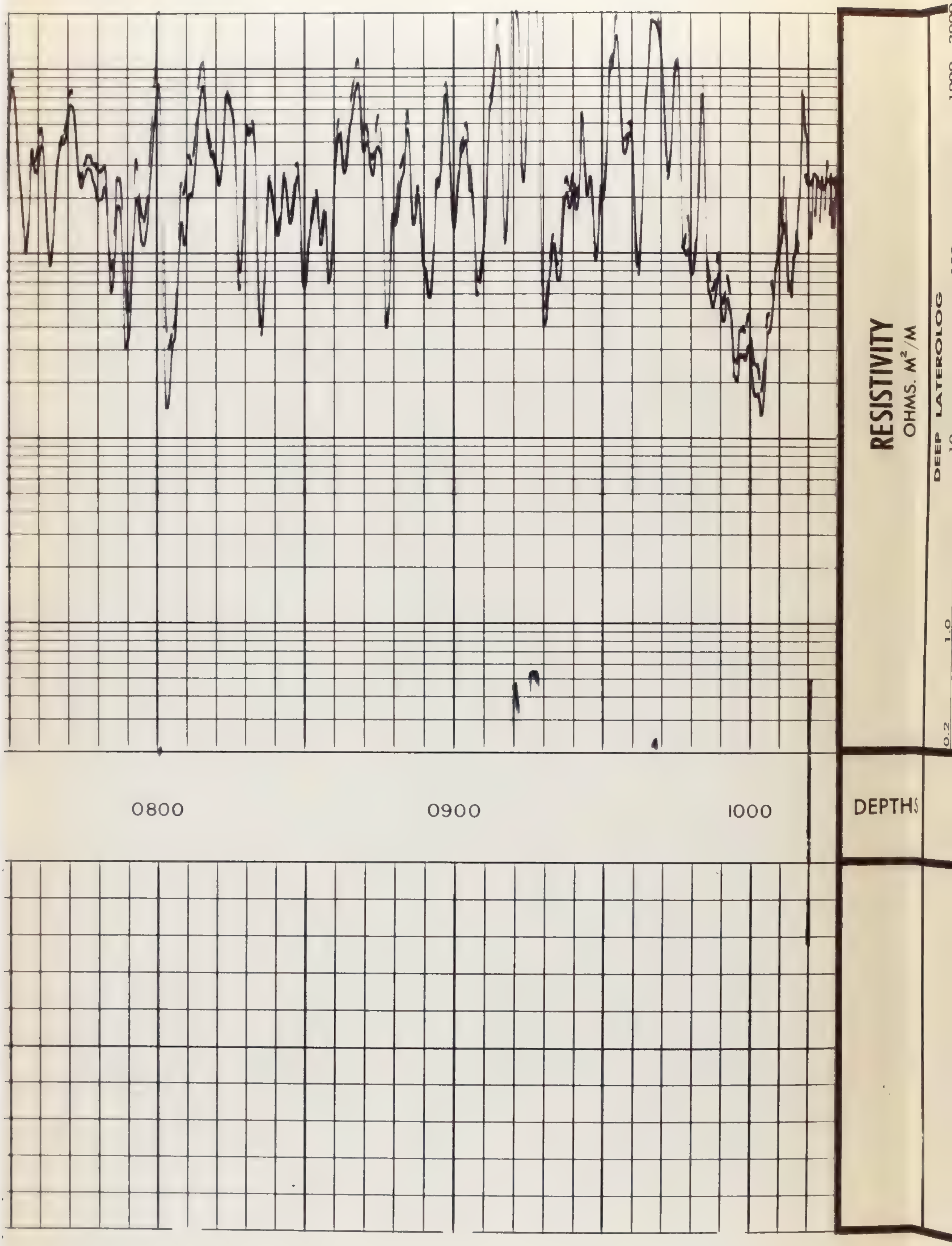
0.2 1.0 10 100 1000 2000

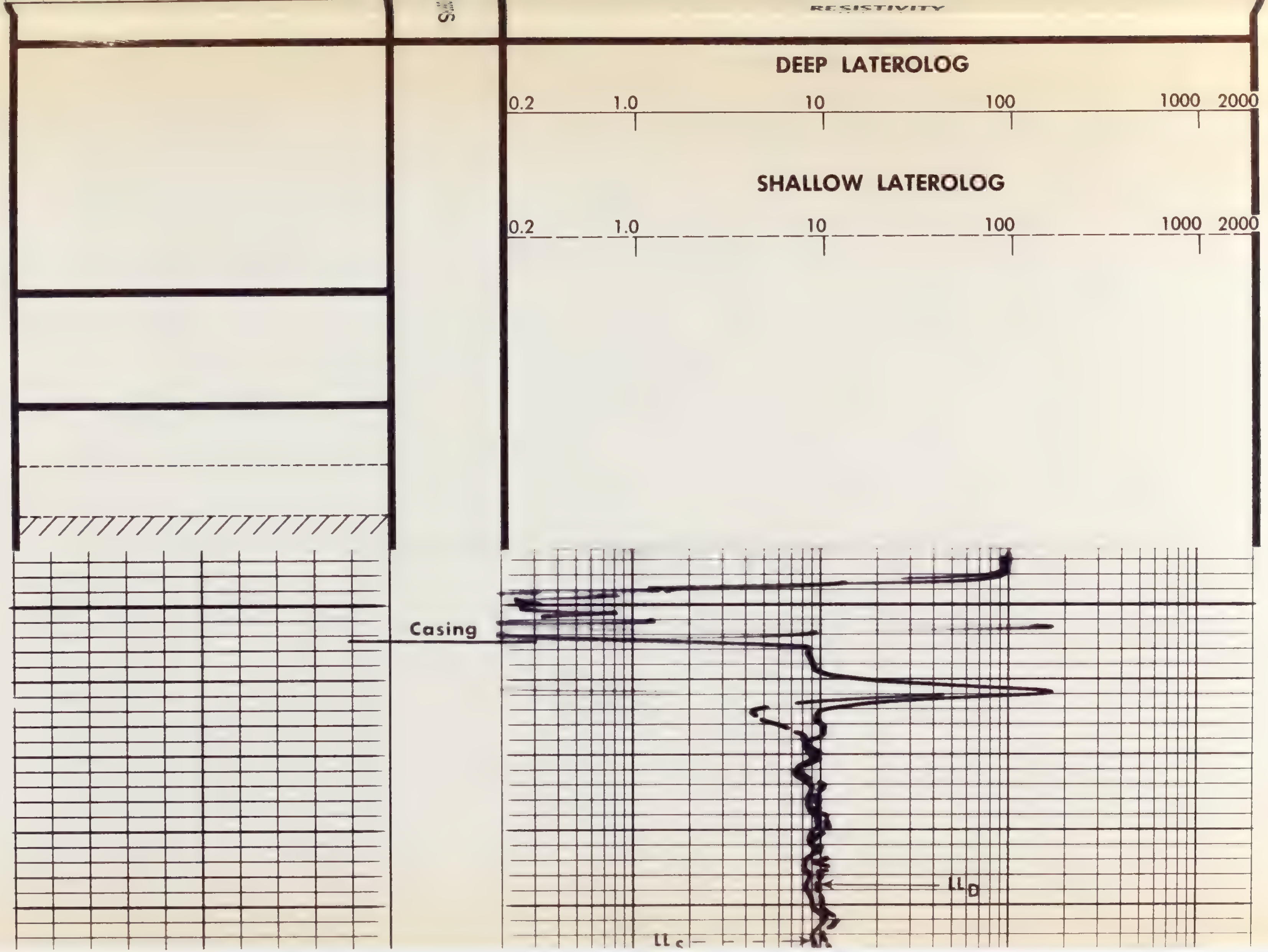
SHALLOW LATEROLOG

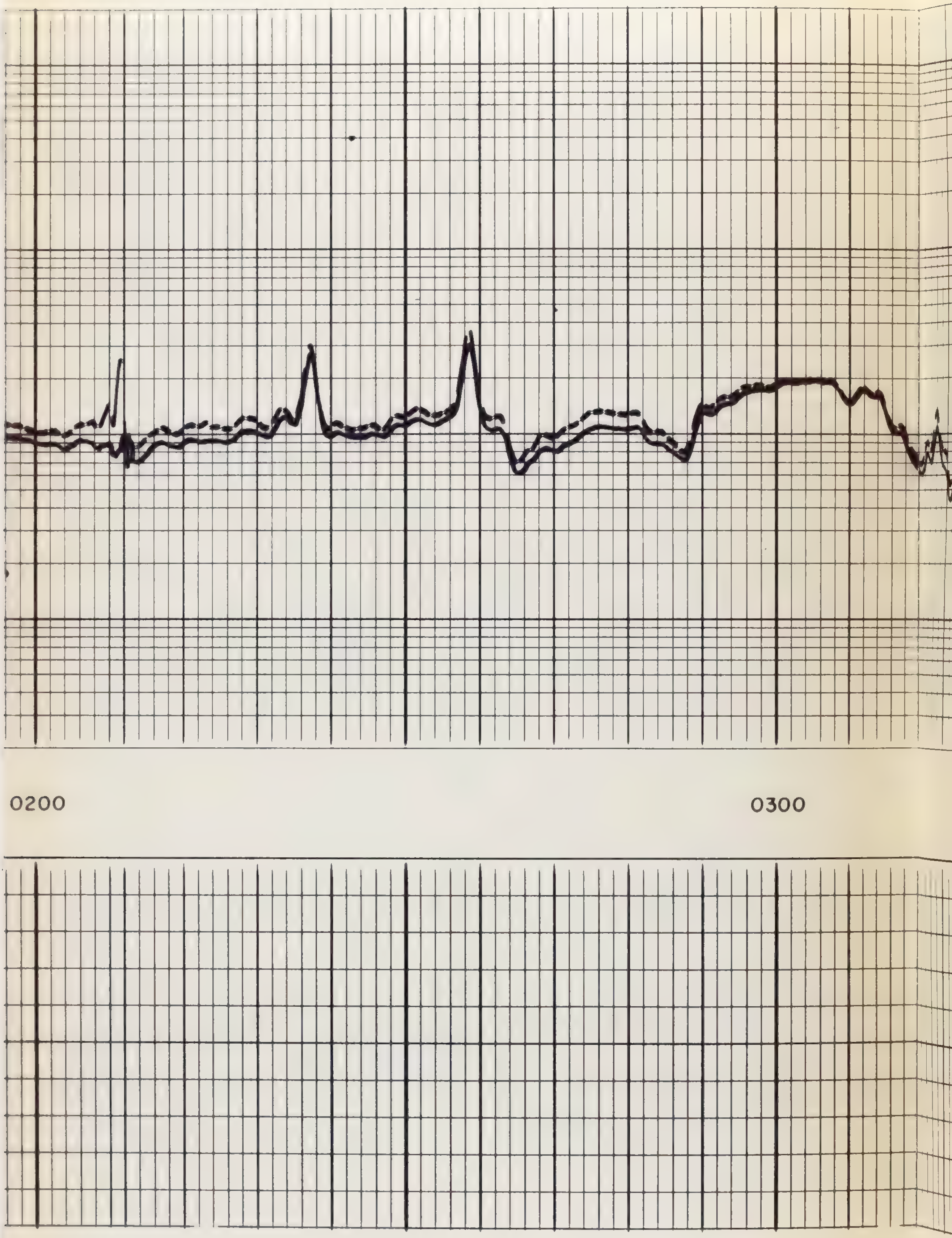
0.2 1.0 10 100 1000 2000

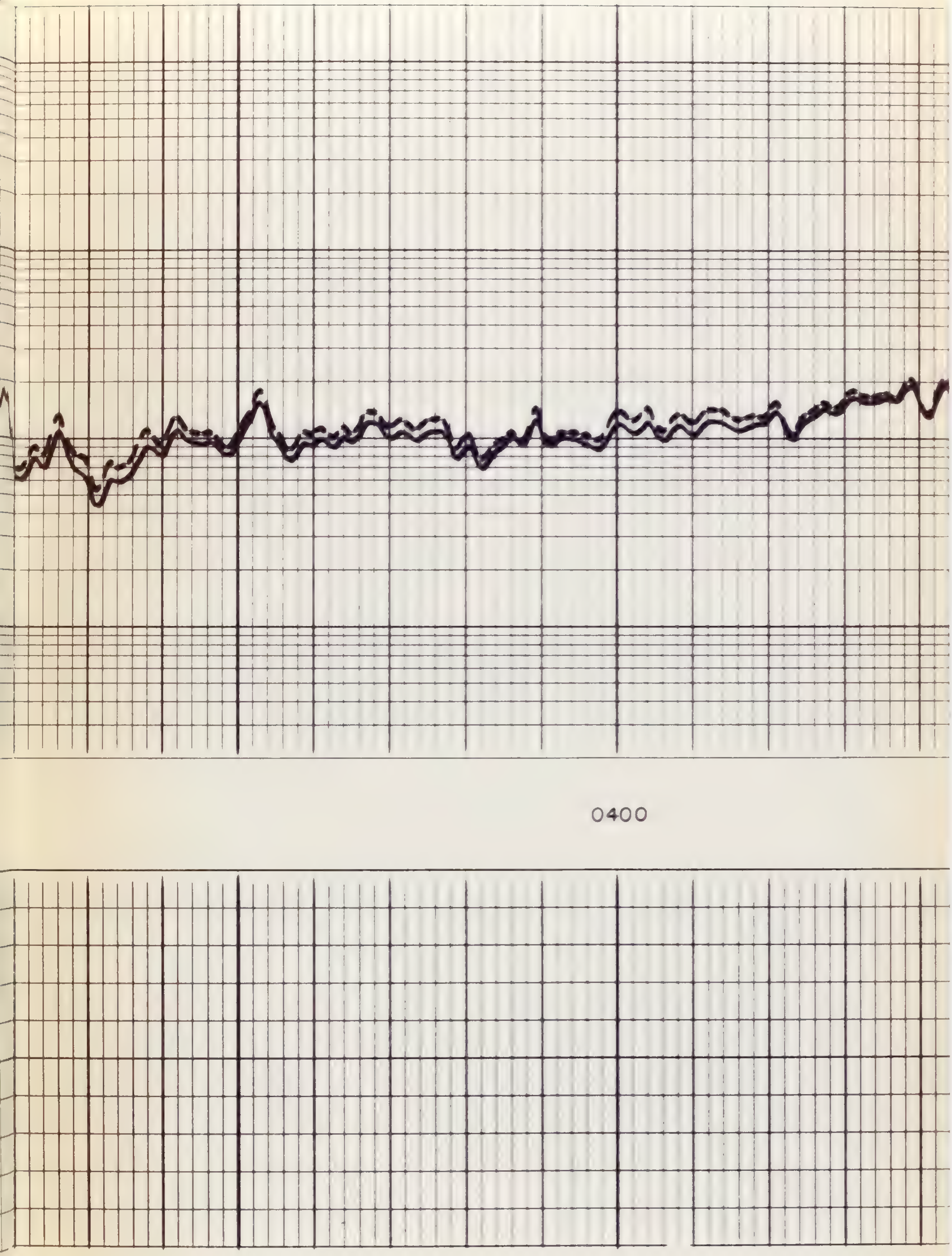

LLs
LLD
Casing
0200
0300
0400


0500
0600
0700


RESISTIVITY
OHMS. M²/M
DEEP LATEROLOG
0.2
1.0
10
100
1000
2000
DEPTHS
0800
0900
1000


RESISTIVITY
DEEP LATEROLOG
0.2
1.0
10
100
1000
2000
SHALLOW LATEROLOG
0.2
1.0
10
100
1000
2000
Casing
LL_D
LL_S


0200
0300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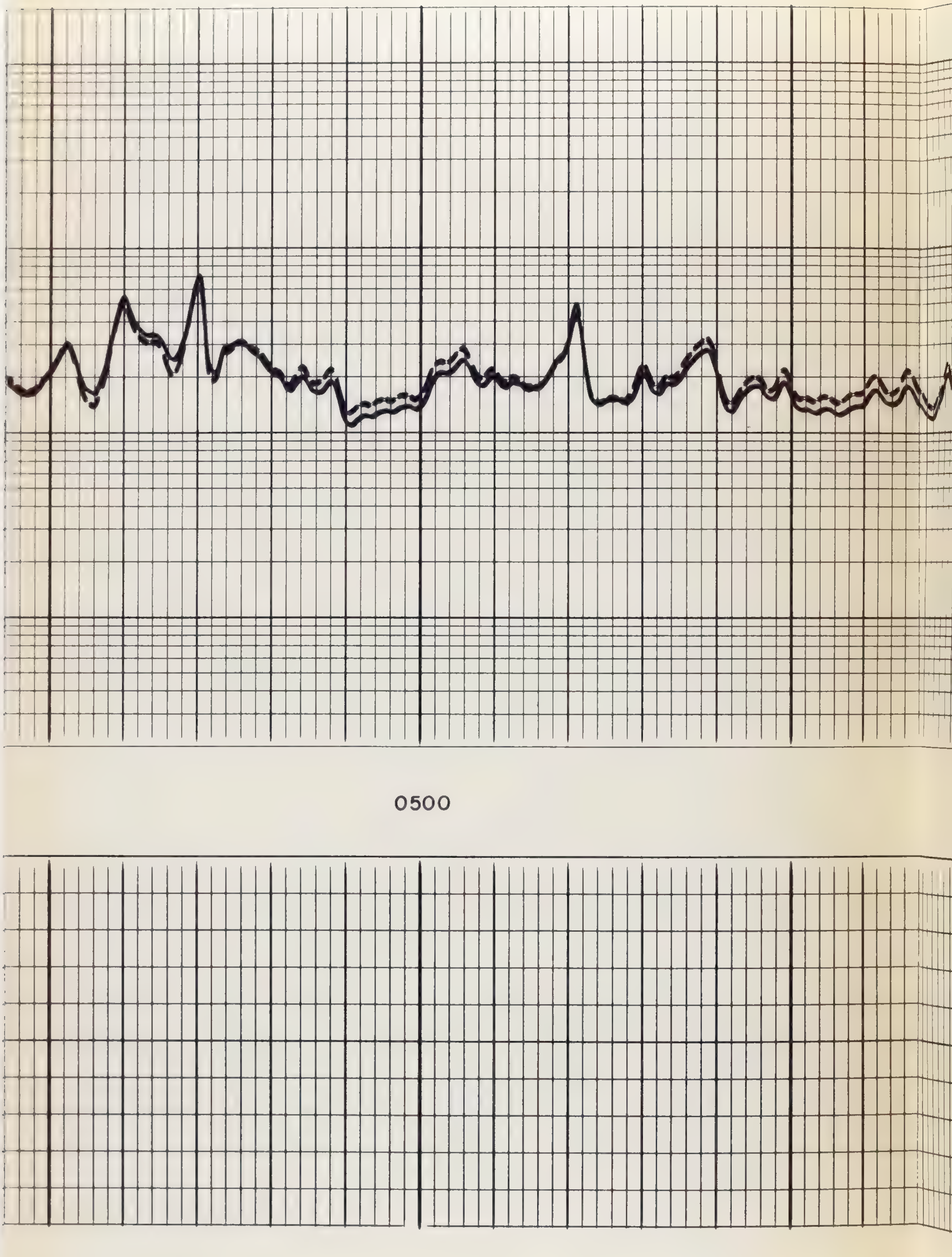
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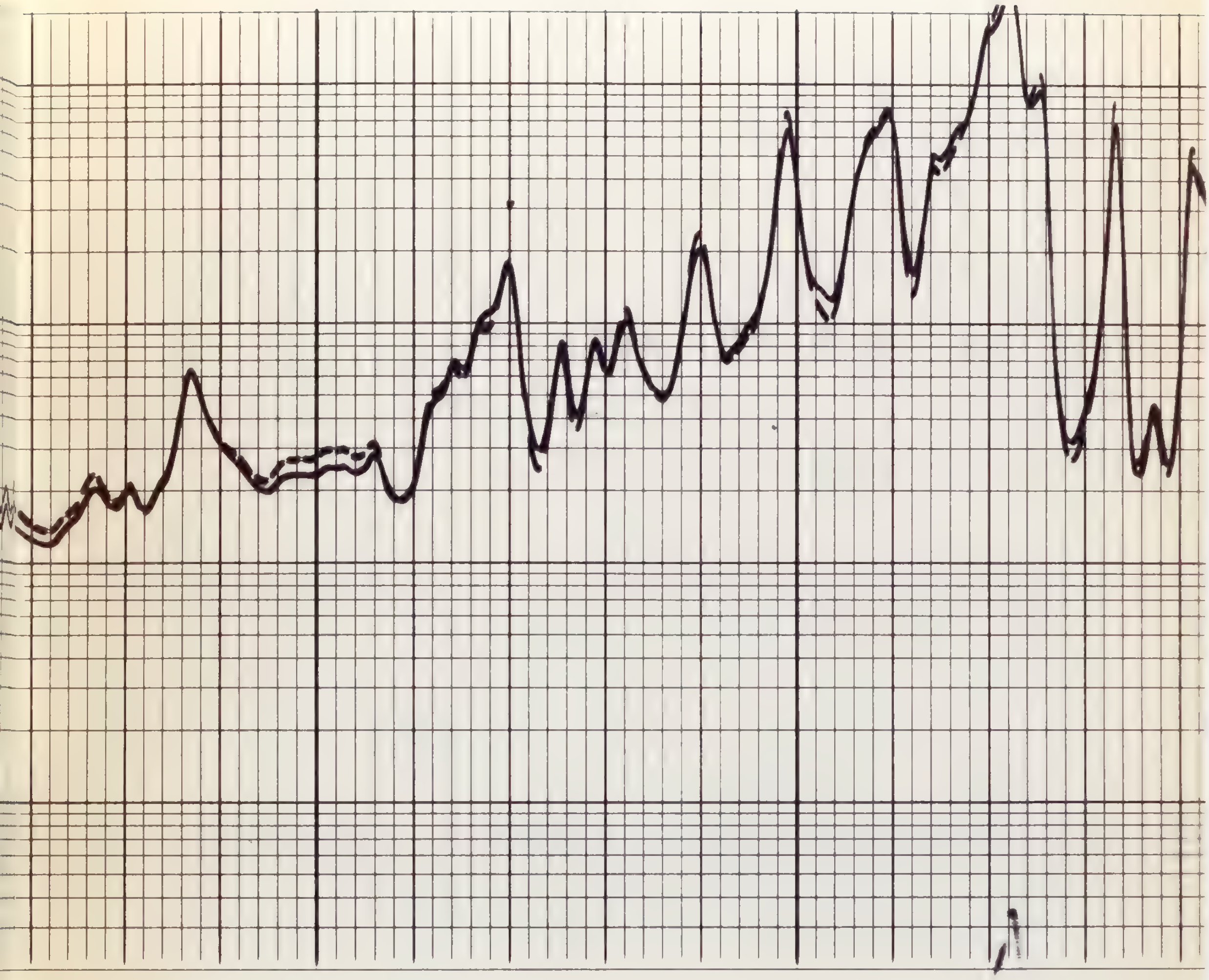

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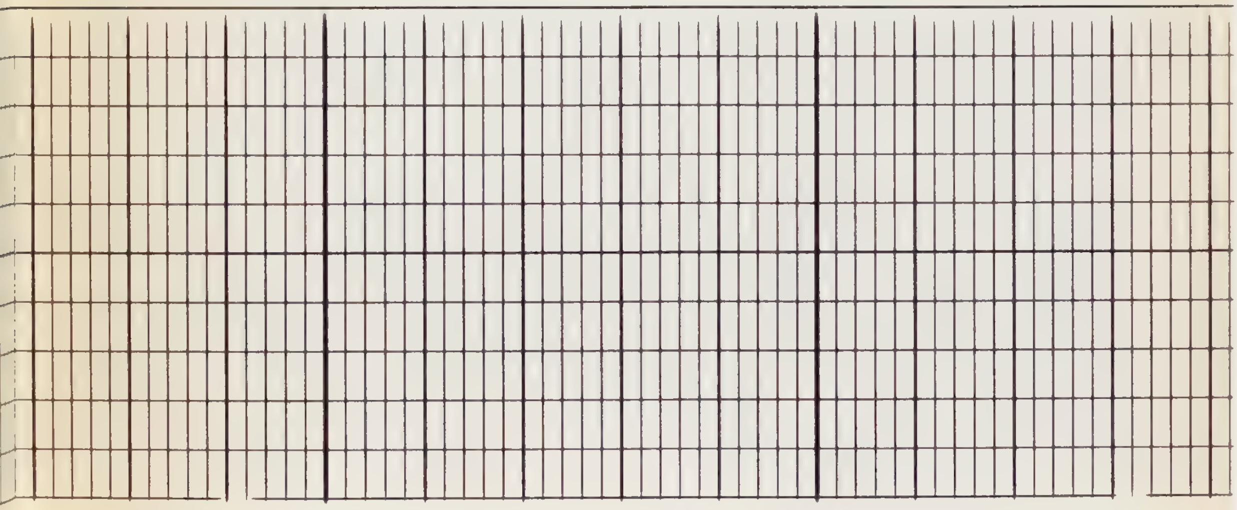
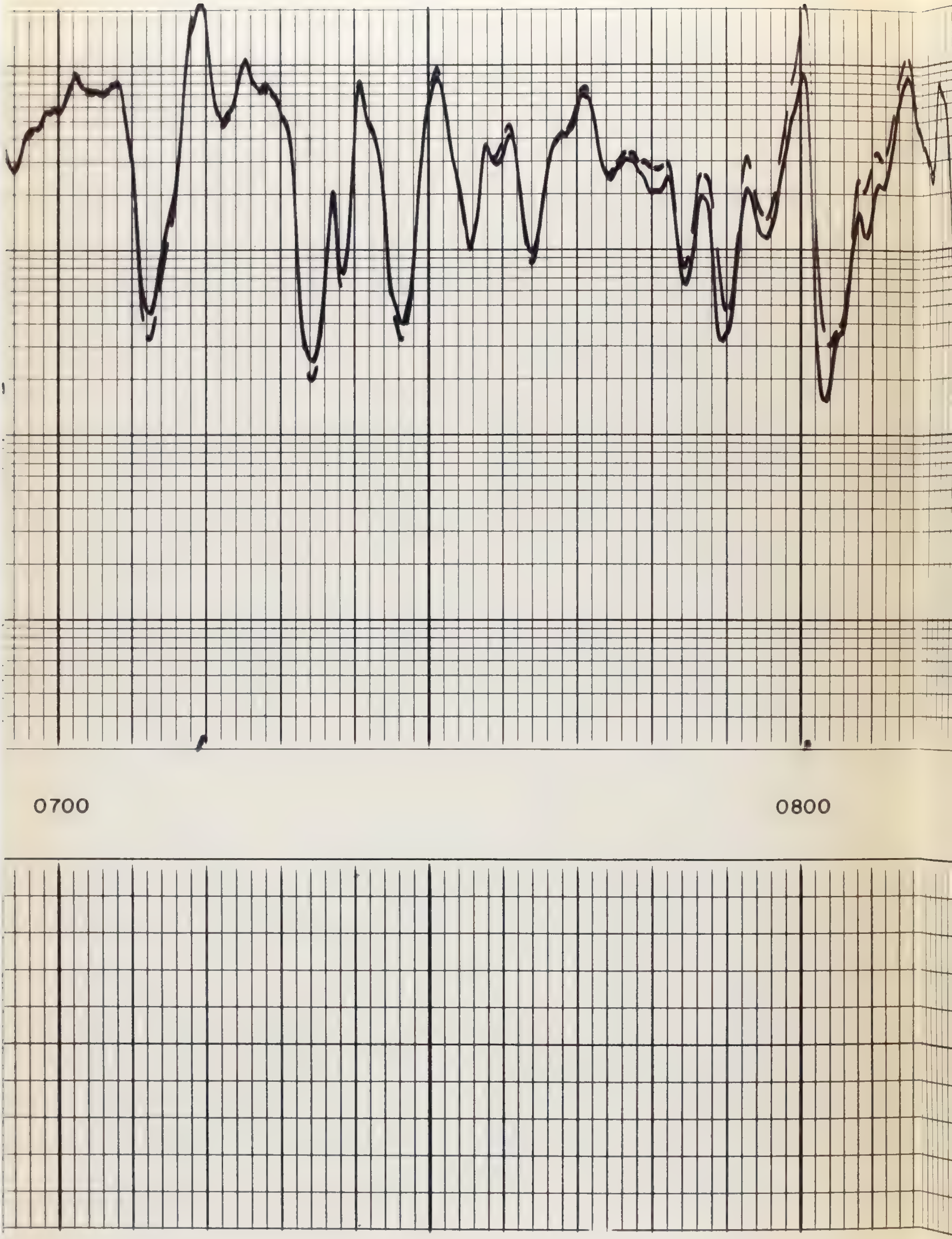
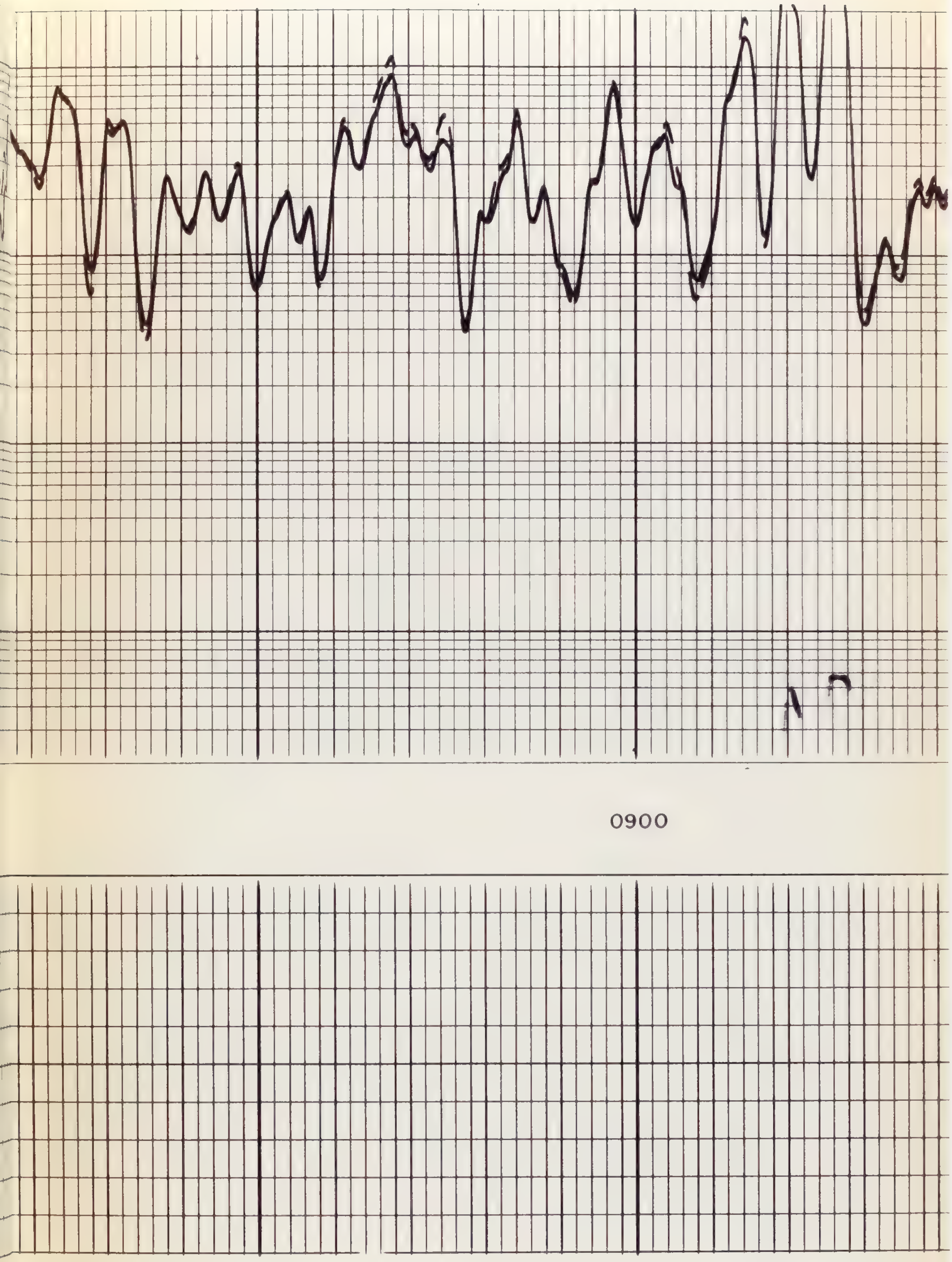
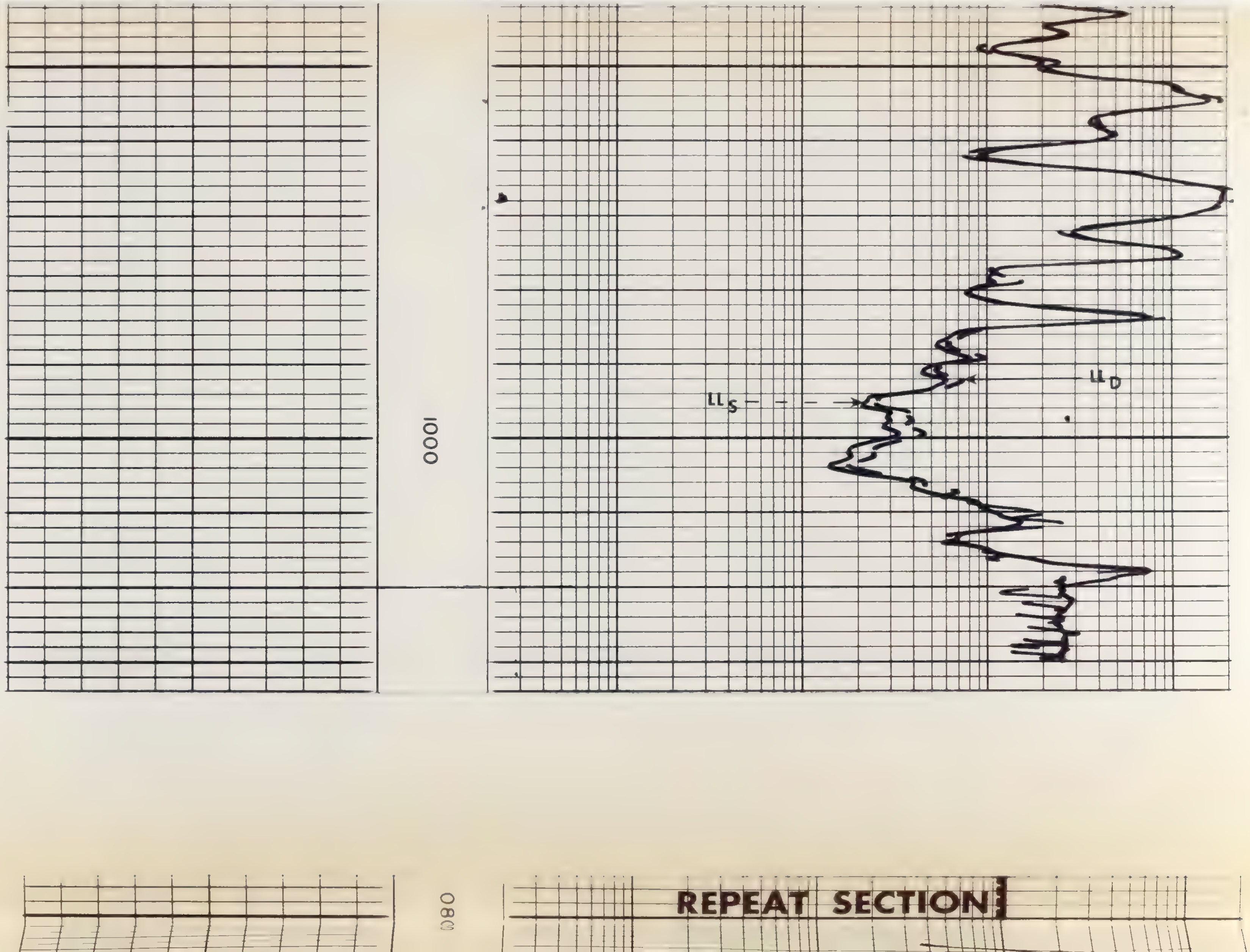
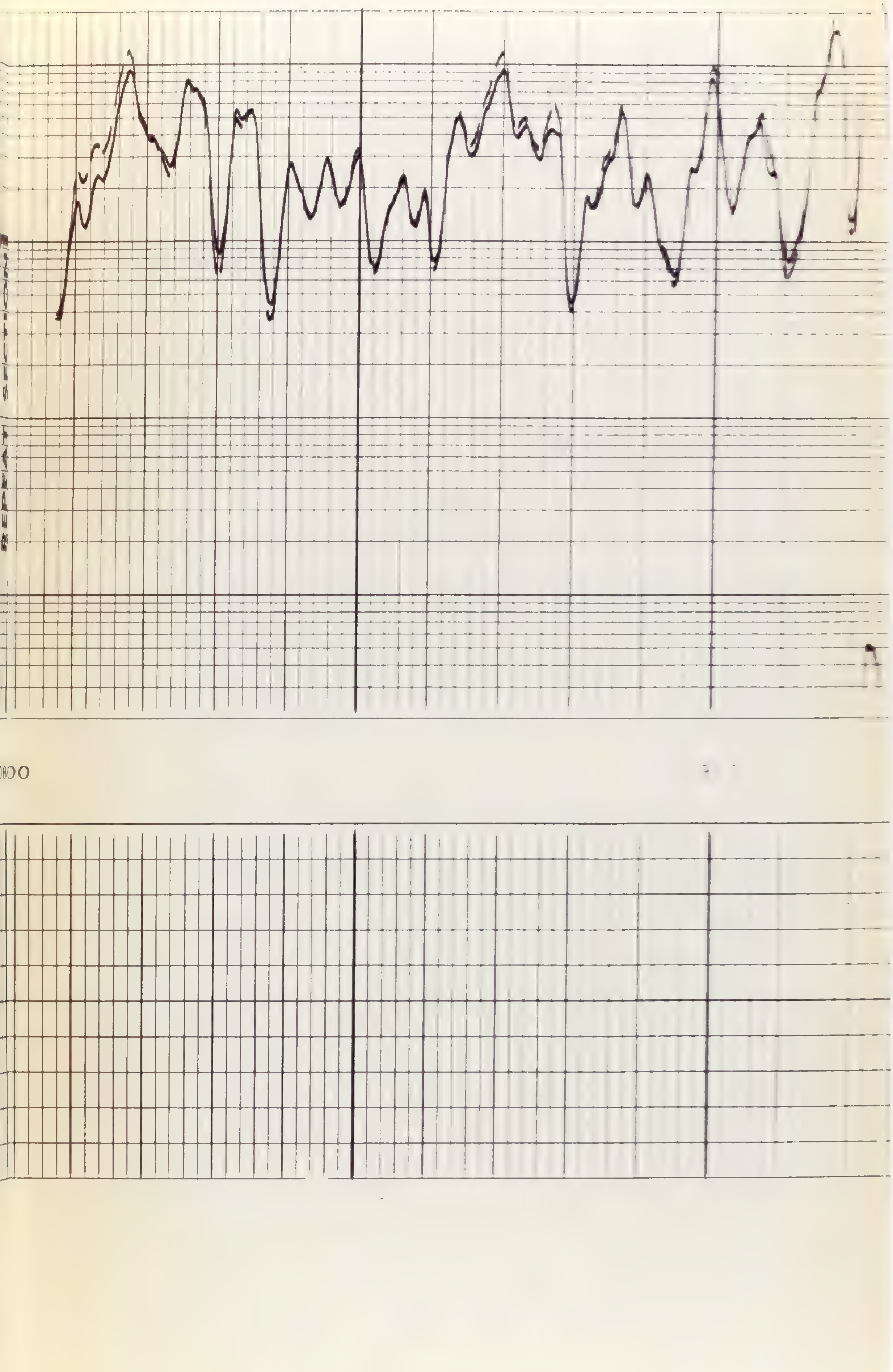
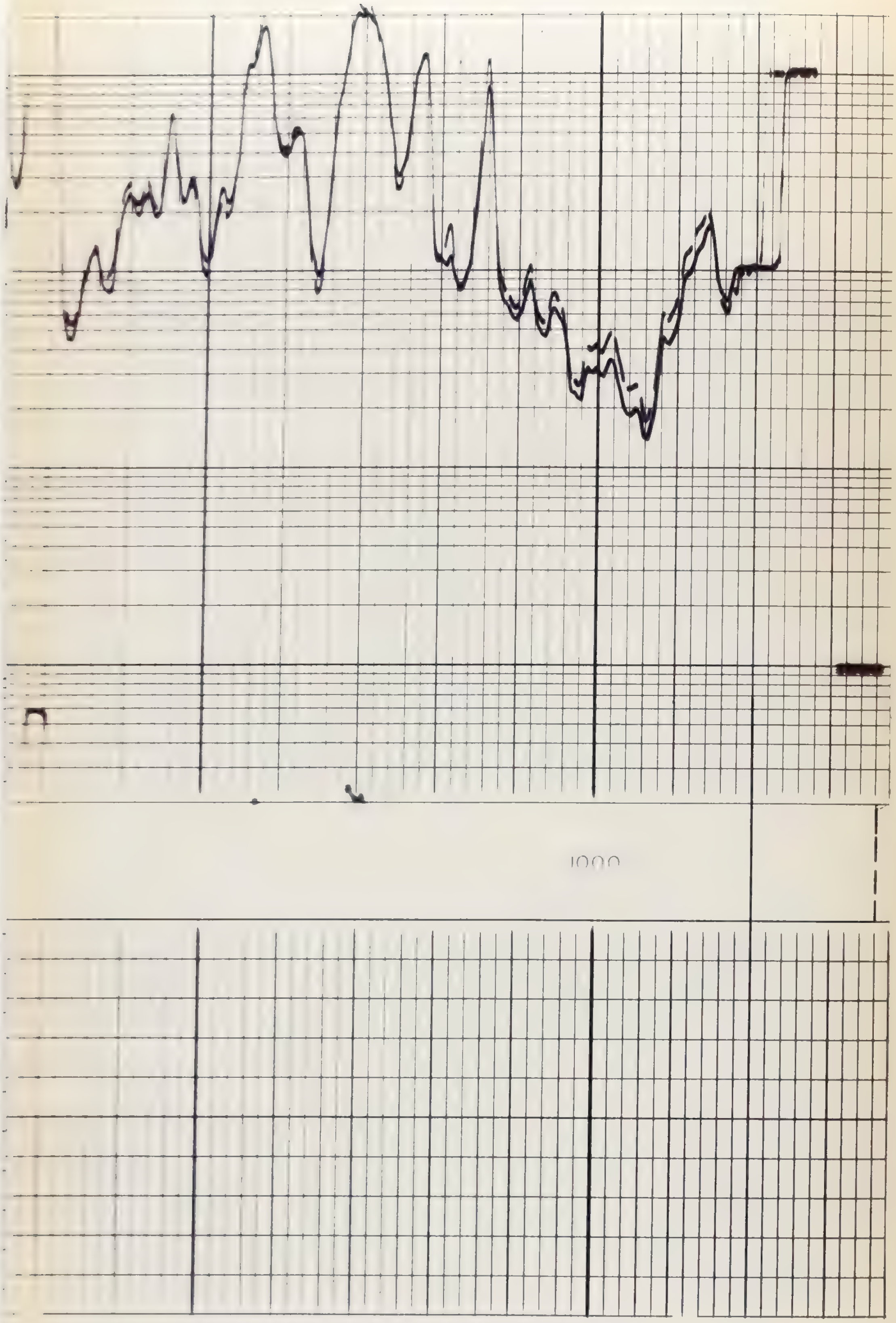


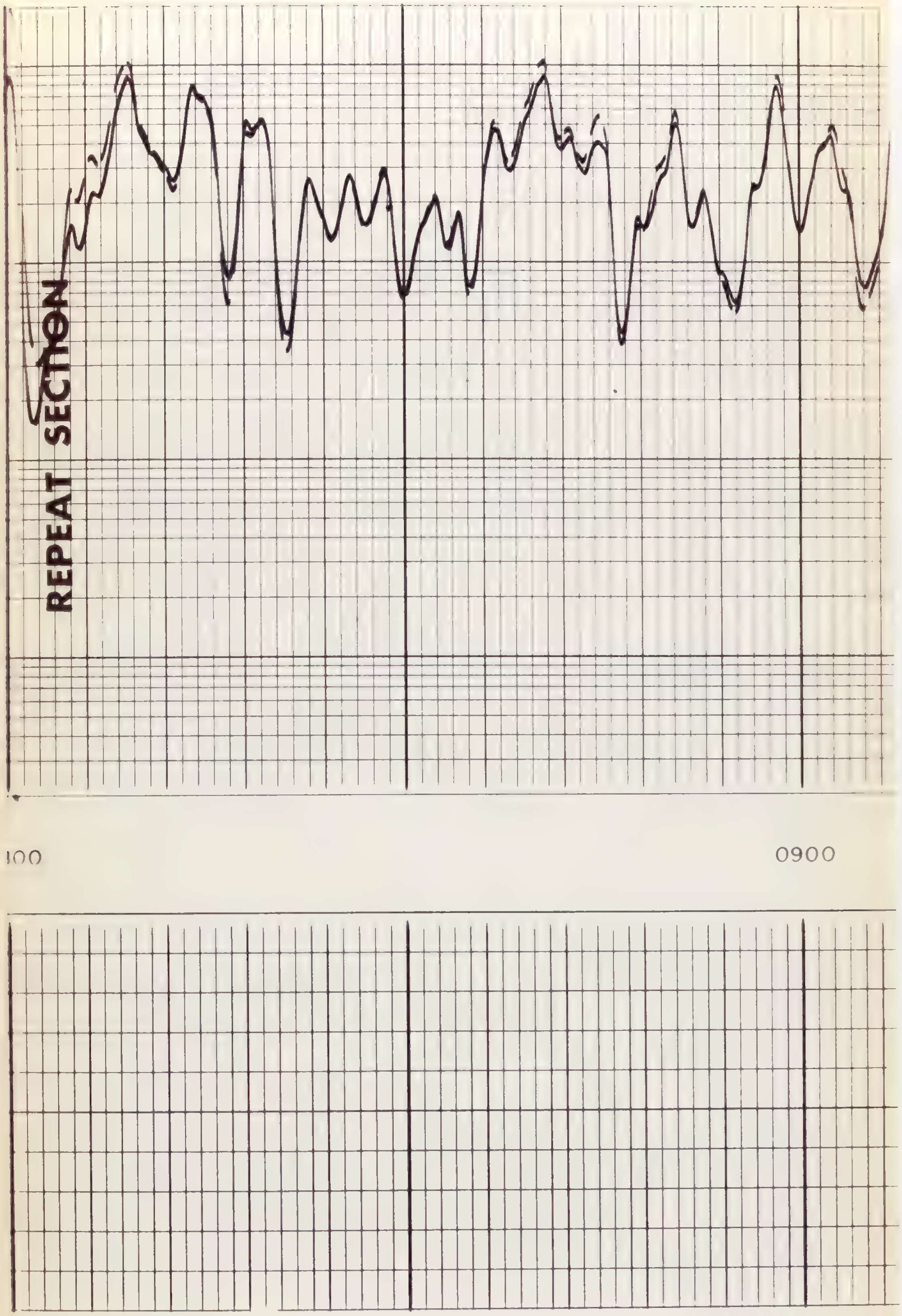

0700
0800

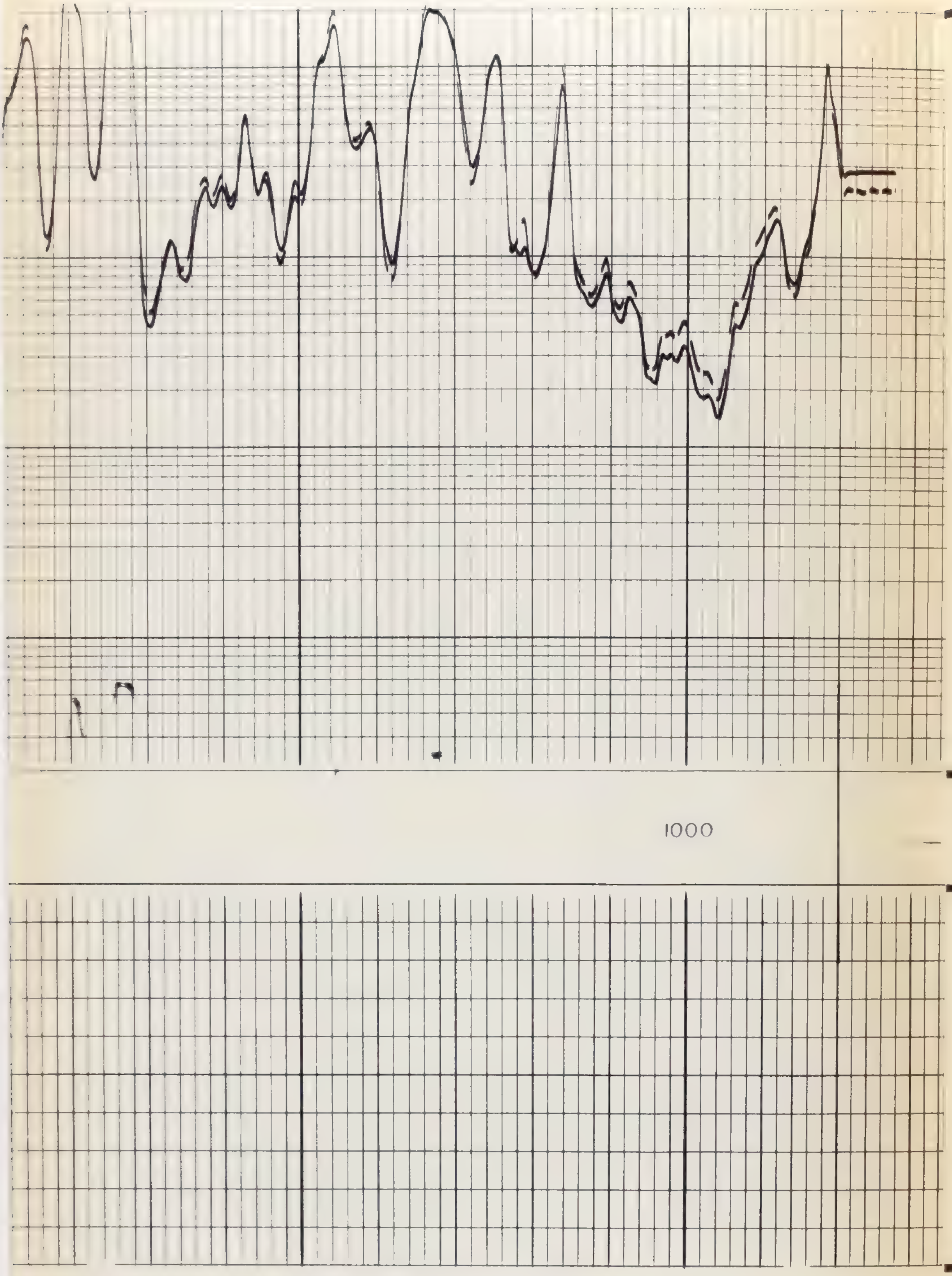

0900

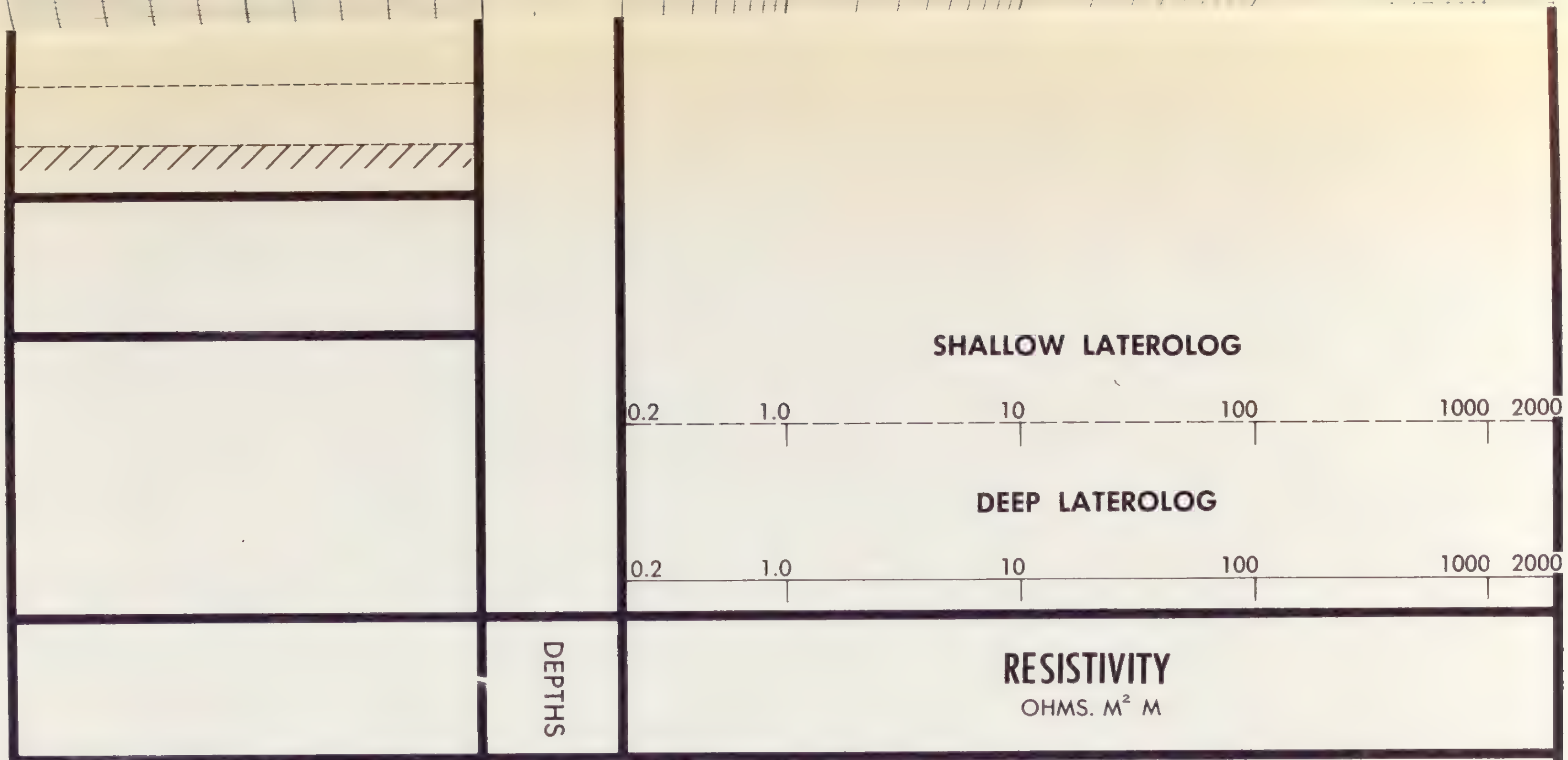

LLS
LLD
1000
080
REPEAT SECTION


REPEAT SECTION
0800


1000


REPEAT SECTION
100
0900


1000


SHALLOW LATEROLOG
0.2
1.0
10
100
1000
2000
DEEP LATEROLOG
0.2
1.0
10
100
1000
2000
DEPTHS
RESISTIVITY
OHMS. M² M

COMPANY ATLANTIC RICHFIELD

WELL S.G. NO.21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Rm ____ @ ____ °F

Rmf ____ @ ____ °F

Rmc ____ @ ____ °F

BHT ____ °F

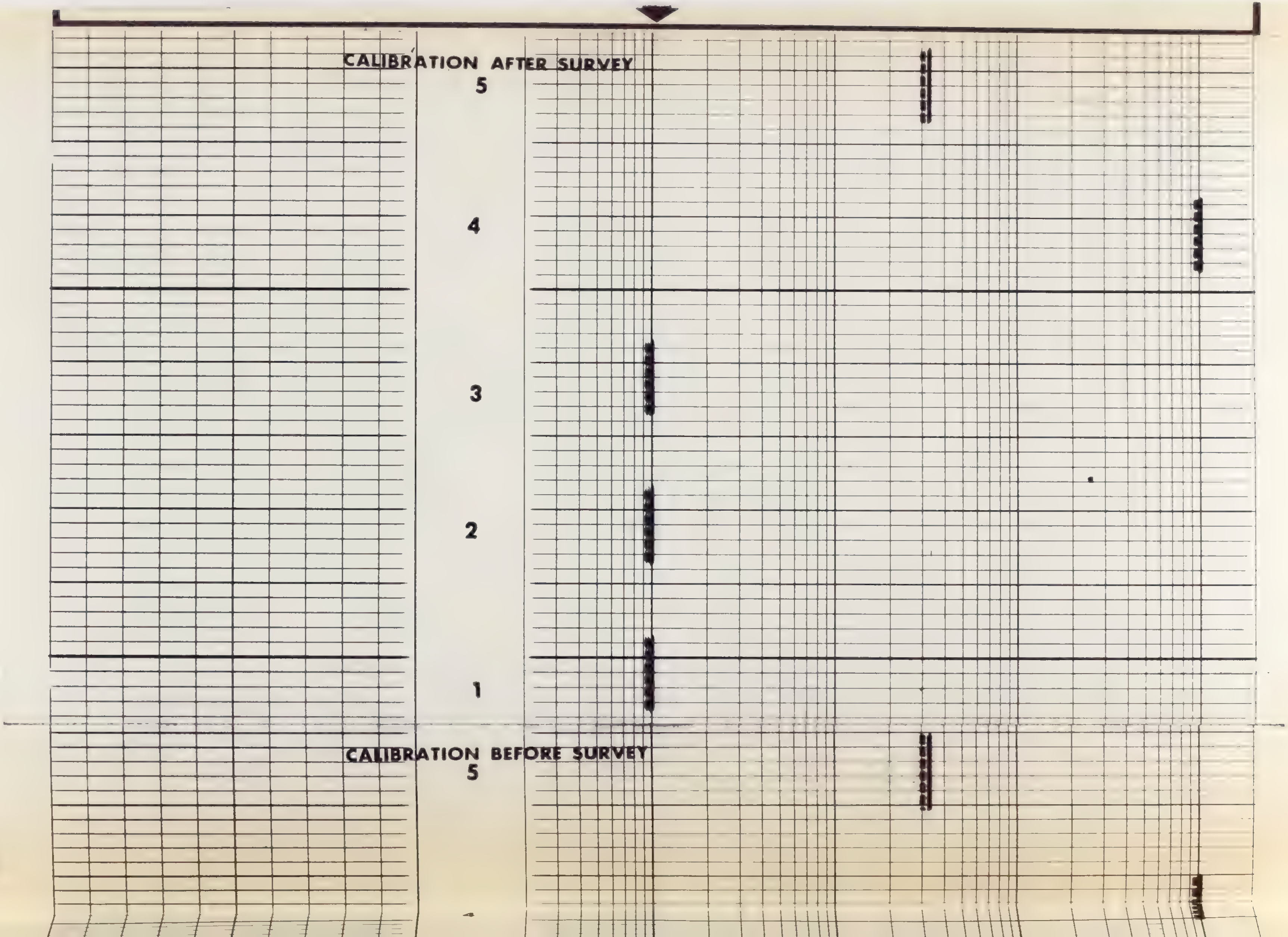
SCHL. FR 1020

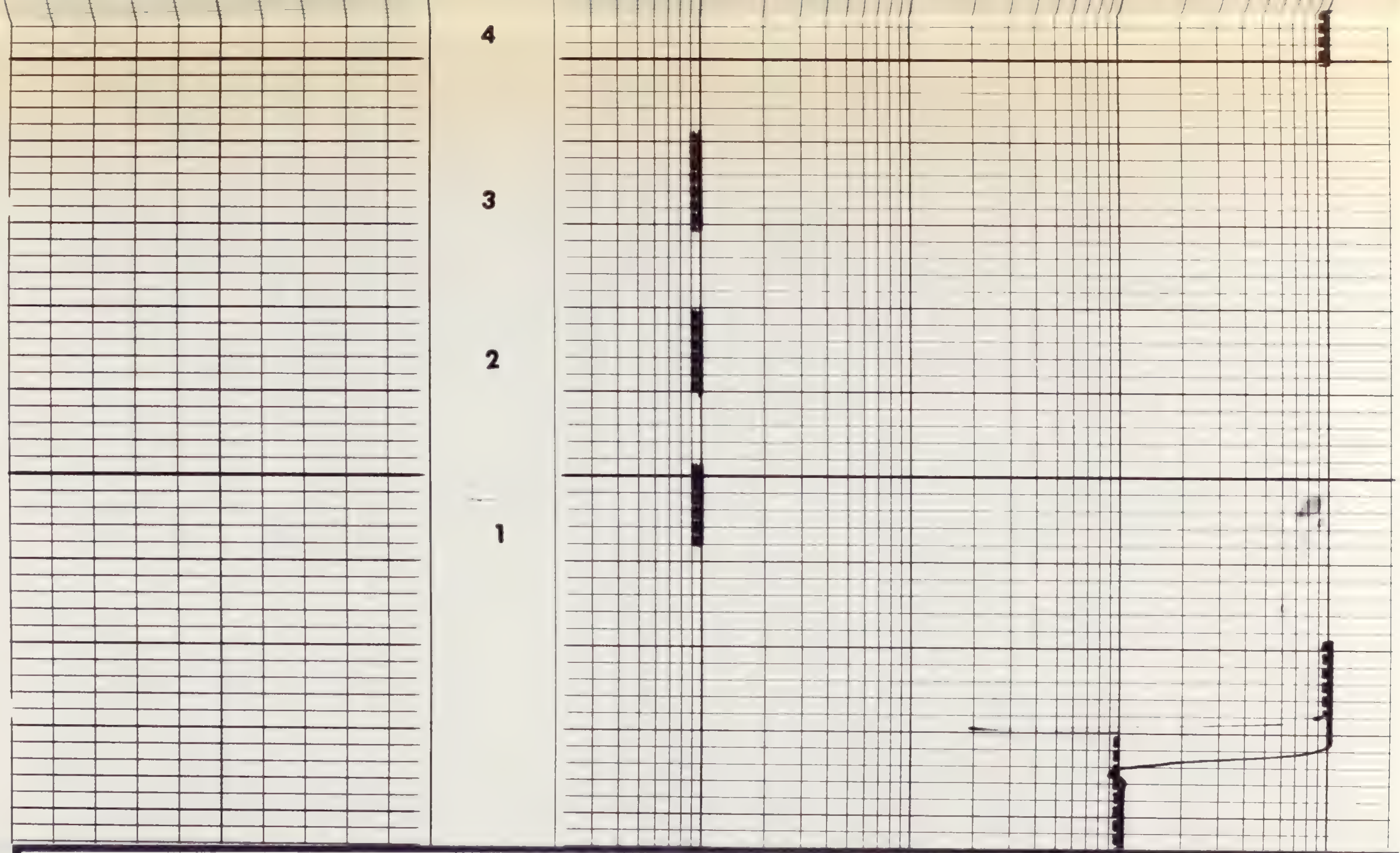
SCHL. TD 1036

DRLR TD 1036

Elev:
KB 6819
DF 6818
GL 6811

CALIBRATION RECORD


CALIBRATION AFTER SURVEY
5
4
3
2
1
CALIBRATION BEFORE SURVEY
5



CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD

SCHL. FR1020
SCHL TD1036

WELL S. G. NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

DRLR TD 1036

Elev:

KB 6819

DF 6818

GL 6811

SWS 1975-A

SG-21

Schlumberger

COMPENSATED FORMATION DENSITY LOG

Gamma-Gamma

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
WELL S. G. # 21
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD

WELL SORGHUM GULCH NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Location: API Serial No.
210.6 FSL& 1528.6 FEL
Sec. 13 Twp. 3S Rge. 97W

Other Services:
DLL
BHC

Permanent Datum: GL ; Elev.: 6811
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 6819
D.F. 6818
G.L. 6811

Date	1/7/75			
Run No.	ONE			
Depth—Driller	1036			
Depth—Logger	1037			
Btm. Log Interval	1036			
Top Log Interval	155			
Casing—Driller	8 5/8@140	@	@	@
Casing—Logger	155			
Bit Size	7 7/8			
Type Fluid in Hole	WATER			
Fluid Level	EST. 100'			
Dens. | Visc.				
pH | Fluid Los	ml	ml	ml	
Source of Sample	MUD PIT			
R_m @ Meas. Temp.	14.7 @69 °F	@ °F	@ °F	@
R_{mf} @ Meas. Temp.	@ °F	@ °F	@ °F	@
R_{mc} @ Meas. Temp.	@ °F	@ °F	@ °F	@
Source: R_{mf} | R_{mc}	CLEAR | WATER			
R_m @ BHT	14.7 @70 °F	@ F	@ °F	@
Time Since Circ.	2.5 HOURS			
Max. Rec. Temp.	70 °F	°F	°F	
Equip. | Location	5602 | G.J.			
Recorded By	BARGHOUTI			
Witnessed By	BURNS			

SWS-1381-H

FOLD HERE

The well name, location and borehole reference data were furnished by the customer.

CHANGES IN MUD TYPE OR ADDITIONAL SAMPLES

Date	Sample No.			
Depth - Driller				
Type Fluid				
Source of Sample				
R_m @ Meas. Temp.	@ °F		@ °F	
R_{mf} @ Meas. Temp.	@ °F		@ °F	
R_{mc} @ Meas. Temp.	@ °F		@ °F	
R_m @ BHT	@ °F		@ °F	
Dens.	Visc.			
ph	Fluid Loss ml			ml
% Water by Vol.				
% Oil by Vol.				
% Solids by Vol.				
Solids Av. Sp. Gr.				

SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

LOGGING DATA

FDC Selectors					
Liquid Density	Grain Density	Hole Fluid	Porosity Scale	From	To
1.00	2.71	LIQ.		1036	155

EQUIPMENT DATA

Run No.	ONE			
Panel No.	169			
Cart No.	289			
Skid No.	688			
Sonde No.	274			
Source	3098			
Calibrator	210			
GR Cart.	284			
TTR				
Mem Panel	235			

REMARKS

Service Order No. - 22494

BIT SIZE CASING DATA

Bit	From	To	Csg. Size	Csg. Wt.	From	To
7-7/8	CSG.	TD.	8 5/8		GL	140

CALIBRATION DATA

CALIBRATION DATA

Run	Gamma Ray			FDC — Before Log — ACPS		FDC — After Log — ACPS	
No.	API Scale	Background CPS	Total CPS	P_1	P_2	P_1	P_2
1	0-150	110	580	528	860	528	860
2							
3							
4							

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to Clause 7 of our General Terms and Conditions as set out in our current Price Schedule.

CALIPER

HOLE DIAM. IN INCHES

6 16

DEPTHS

—.25 0 .25

CORRECTION

GRAMS/CC.

GAMMA RAY

API UNITS

0 150

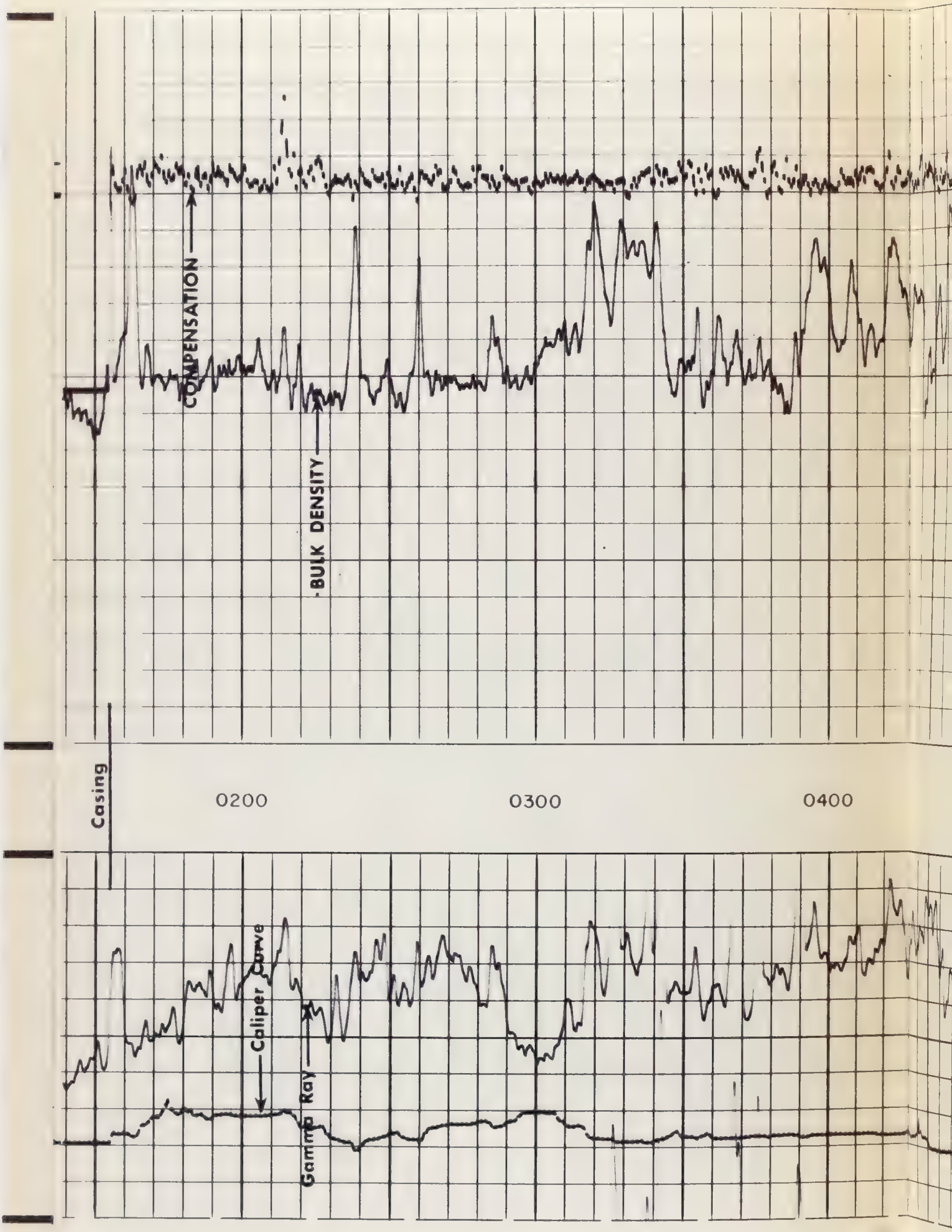
150 300

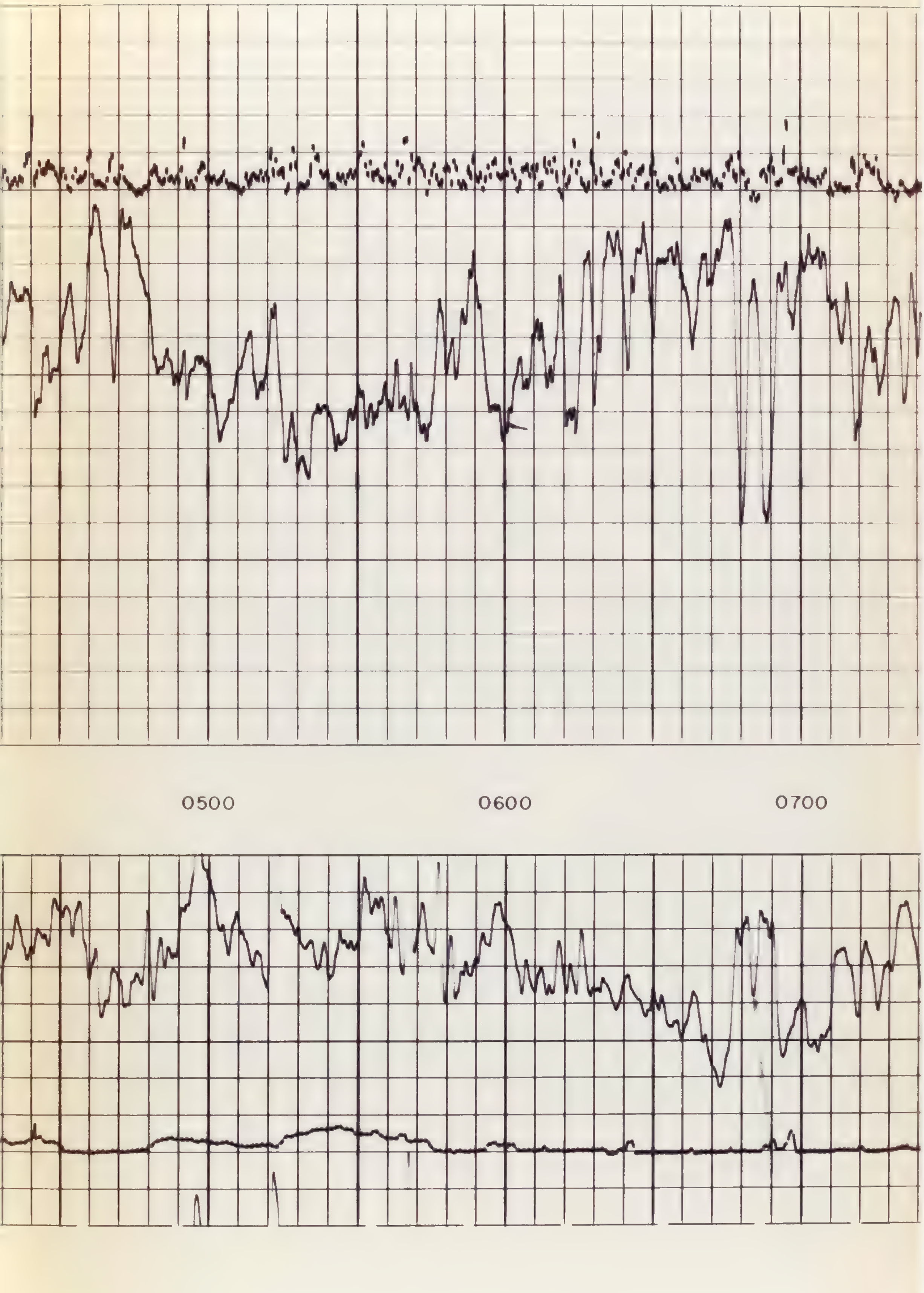
BULK DENSITY

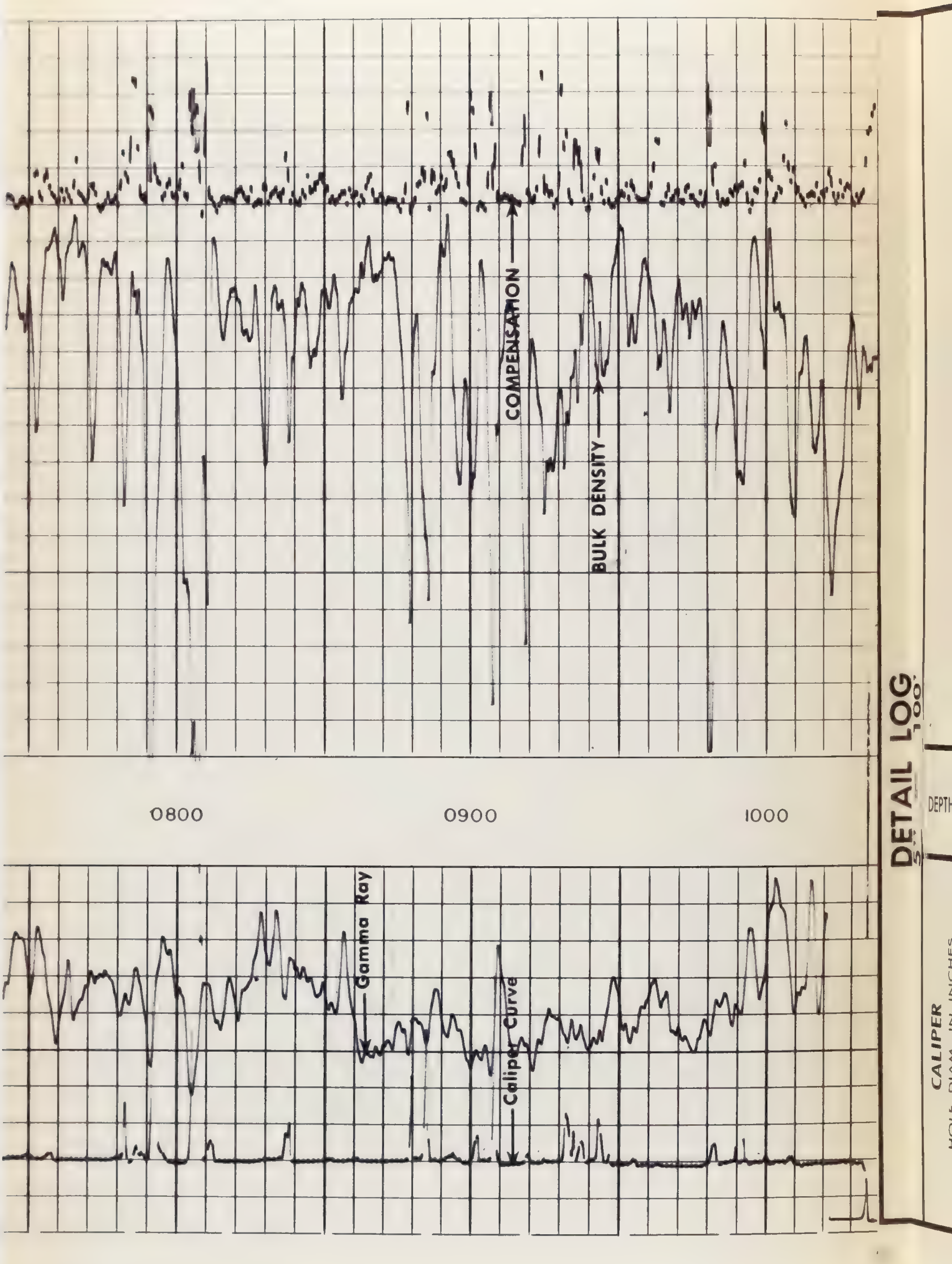
GRAMS CC.

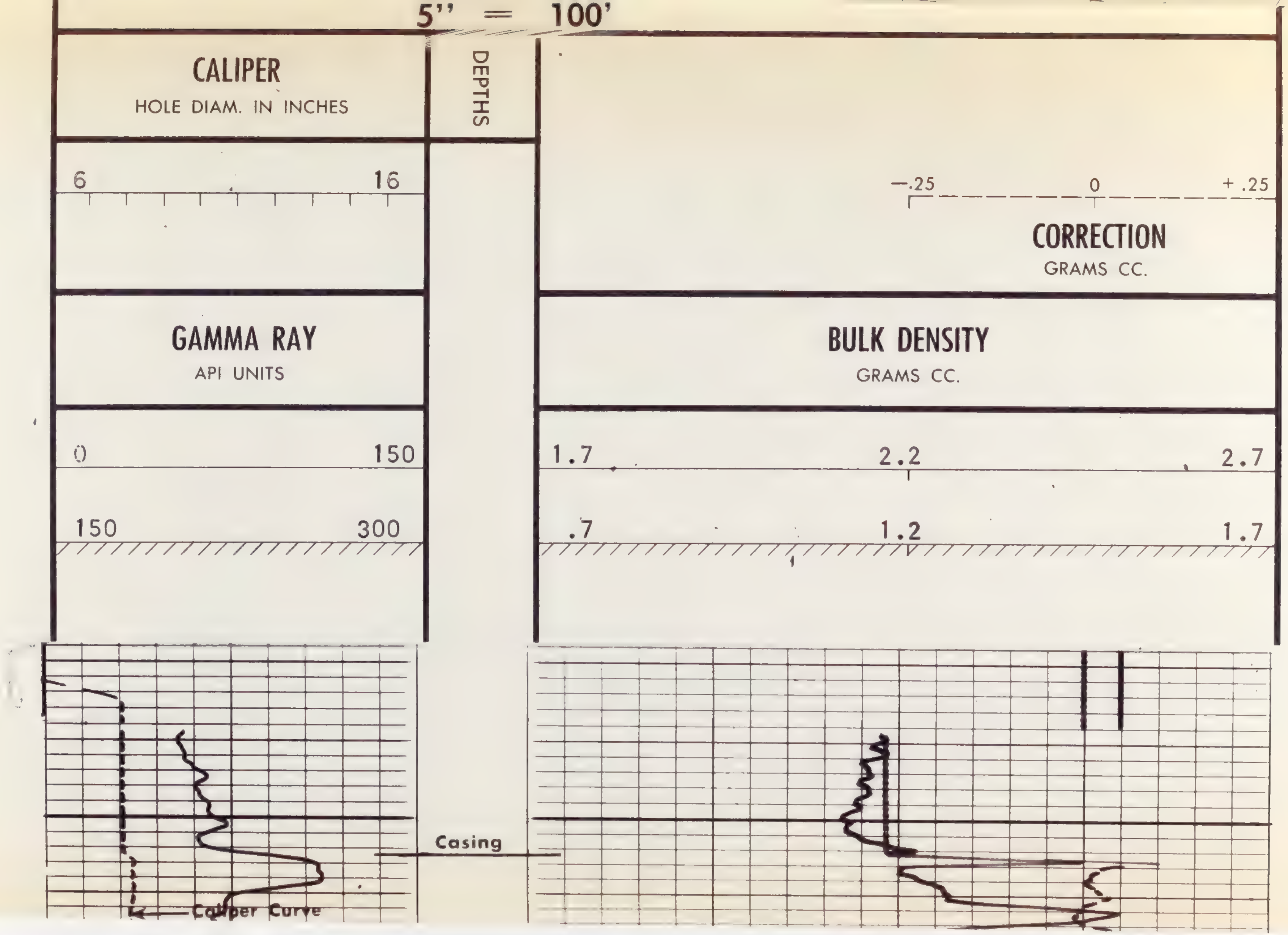
1.7 2.2 2.7

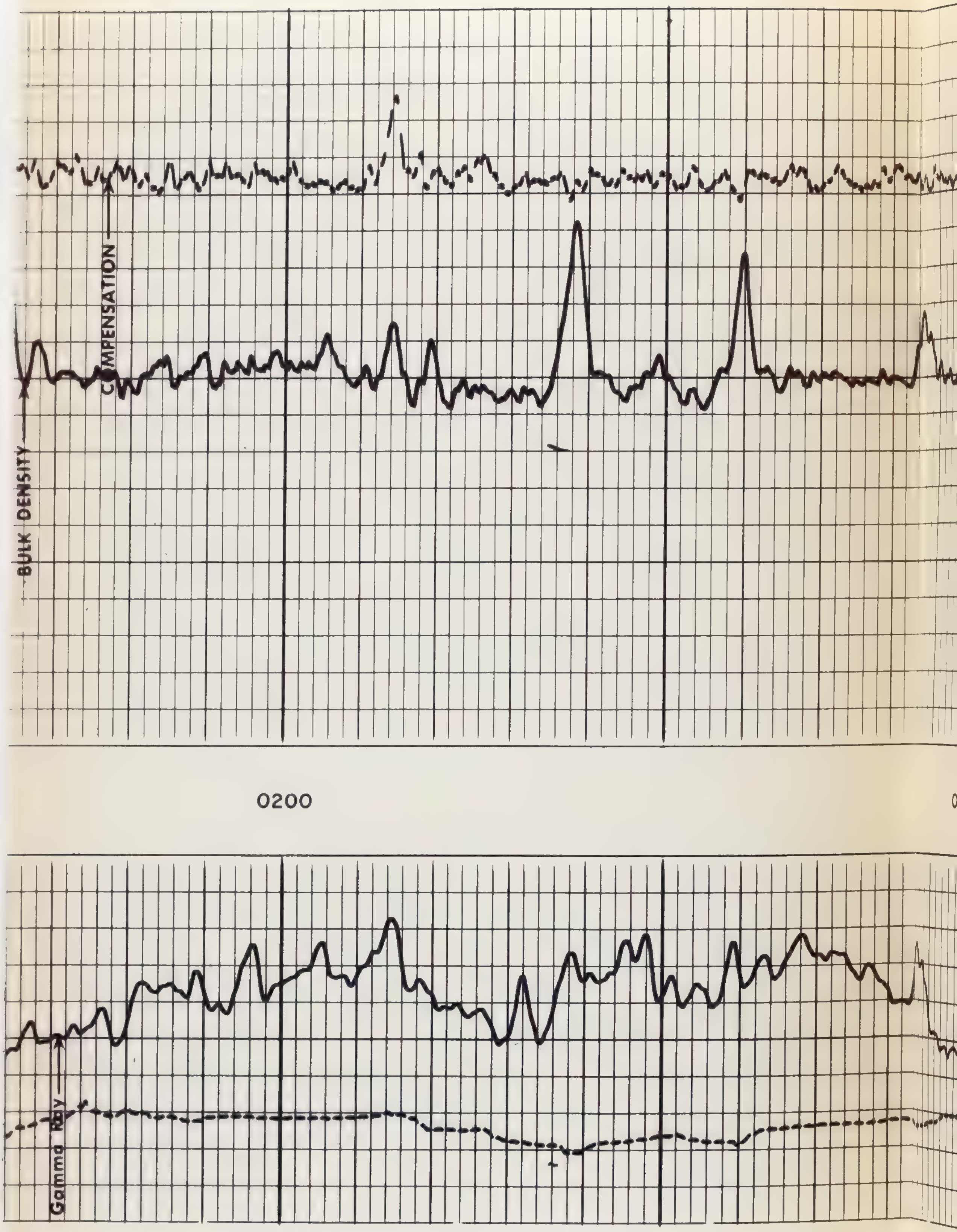
.7 1.2 1.7

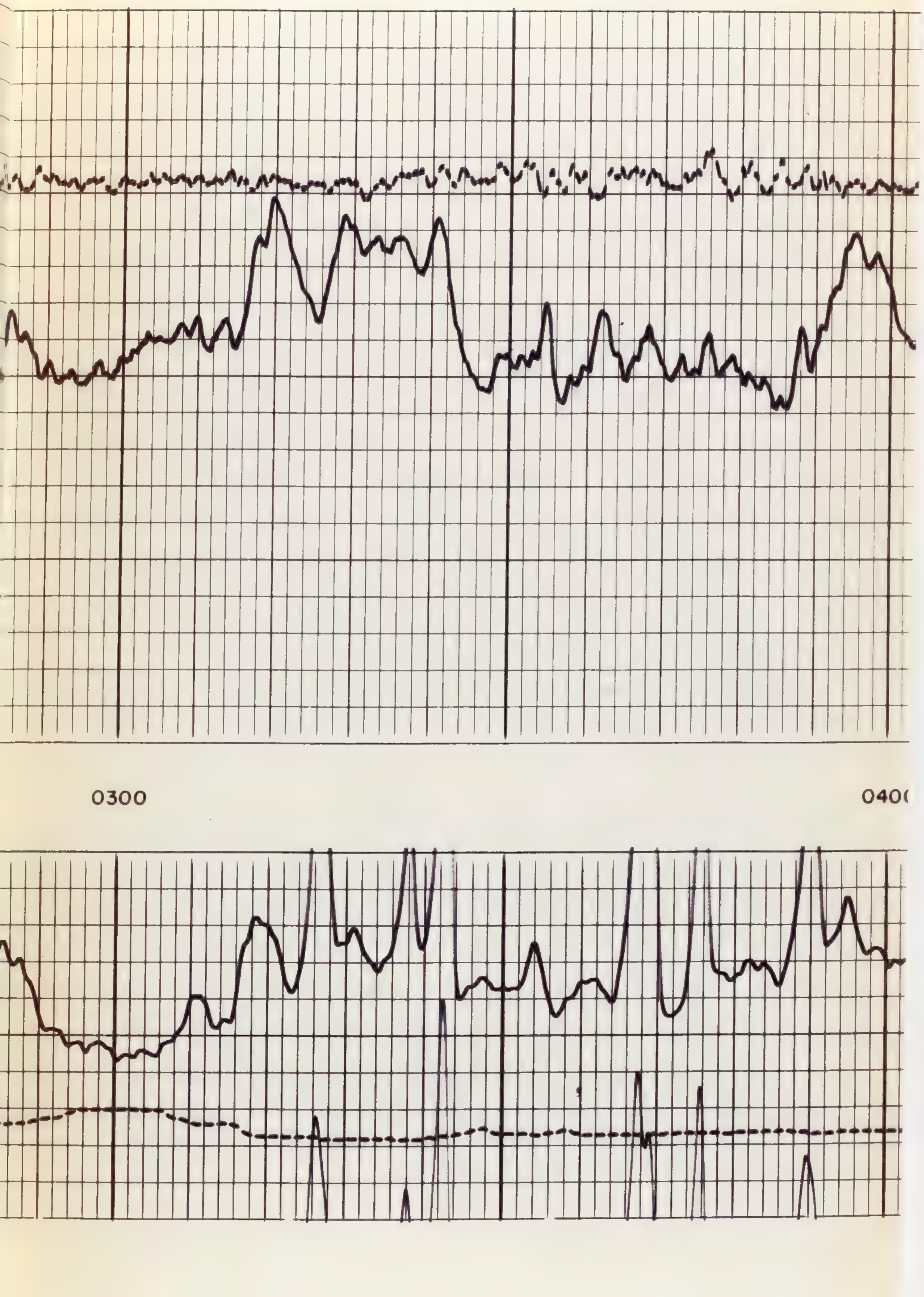

COMPENSATION
BULK DENSITY
Casing
0200
0300
0400
Caliper Curve
Gamma Ray

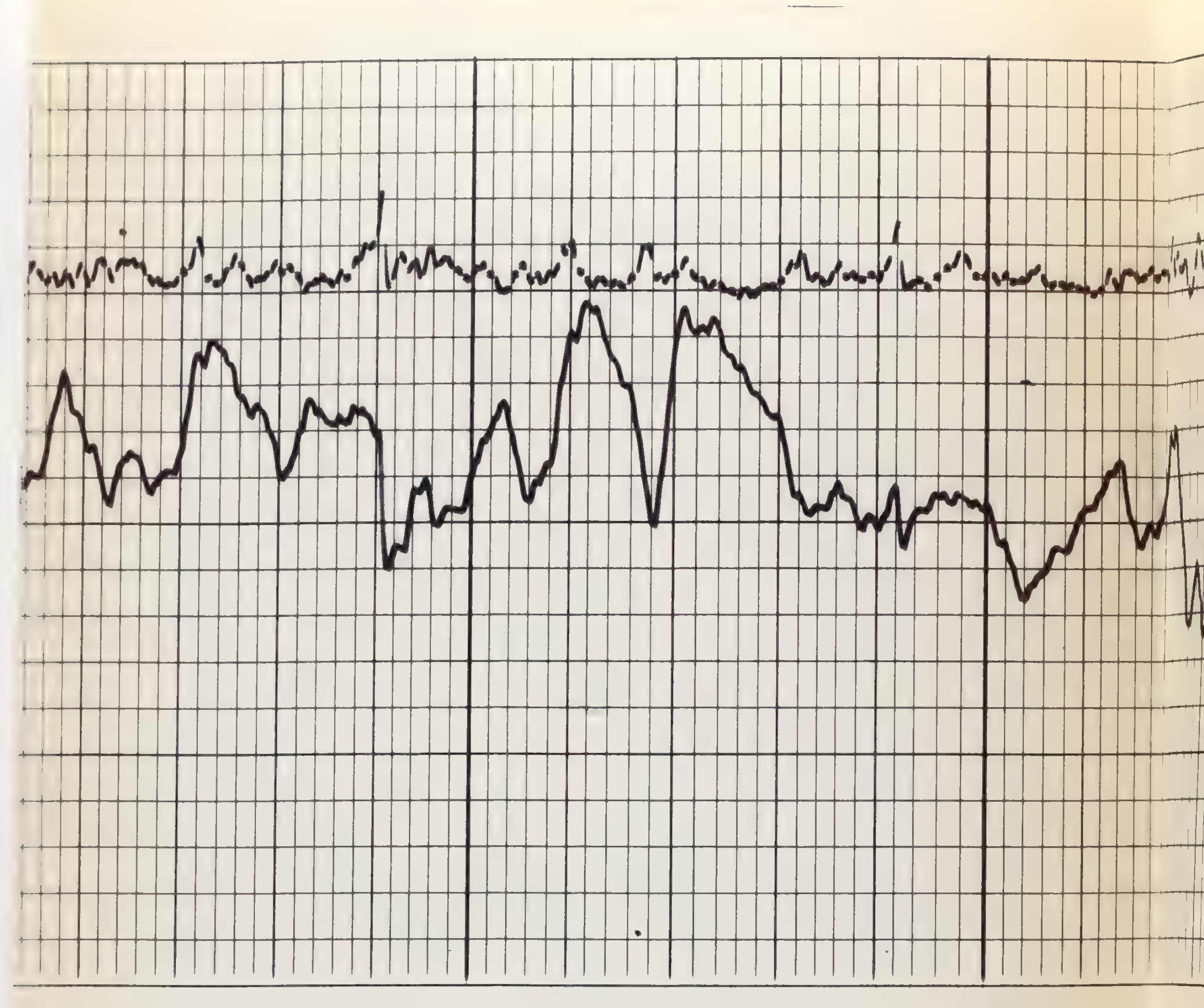

0500
0600
0700

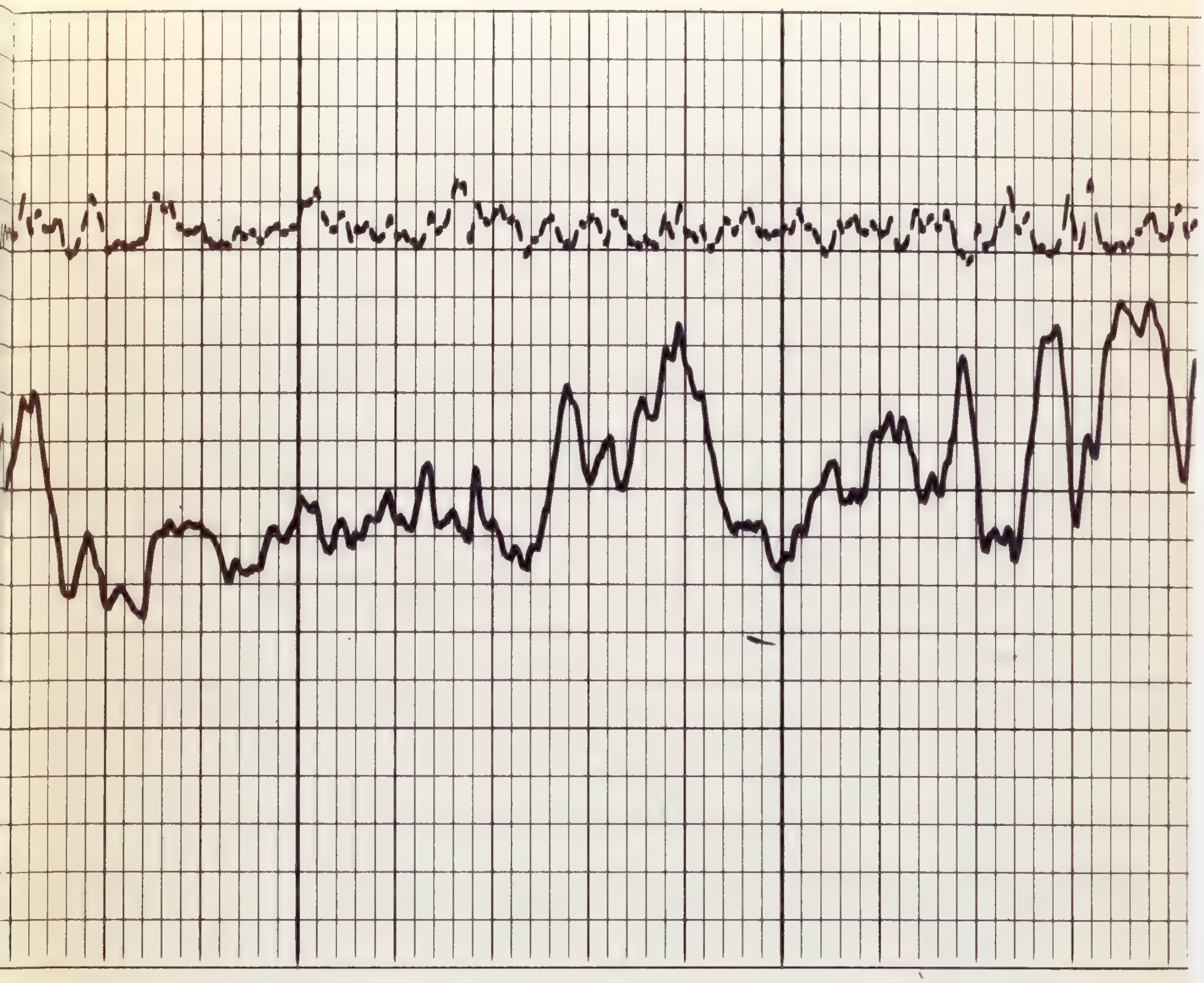

COMPENSATION
BULK DENSITY
0800
0900
1000
Gamma Ray
Caliper Curve
DETAIL LOG
5" = 100'
DEPTH
CALIPER
HOLE DIAM. IN INCHES


5'' = 100'
CALIPER
HOLE DIAM. IN INCHES
6
16
DEPTHS
−.25
0
+ .25
CORRECTION
GRAMS CC.
GAMMA RAY
API UNITS
0
150
150
300
BULK DENSITY
GRAMS CC.
1.7
2.2
2.7
.7
1.2
1.7
Casing
Caliper Curve

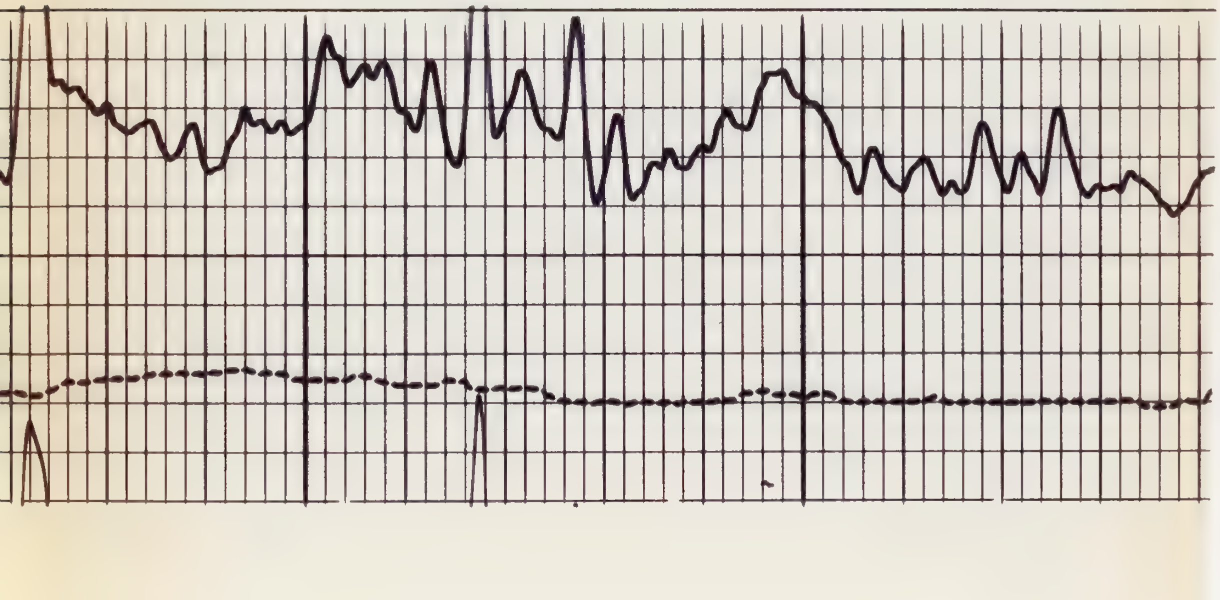

COMPENSATION
BULK DENSITY
0200
Gamma Ray

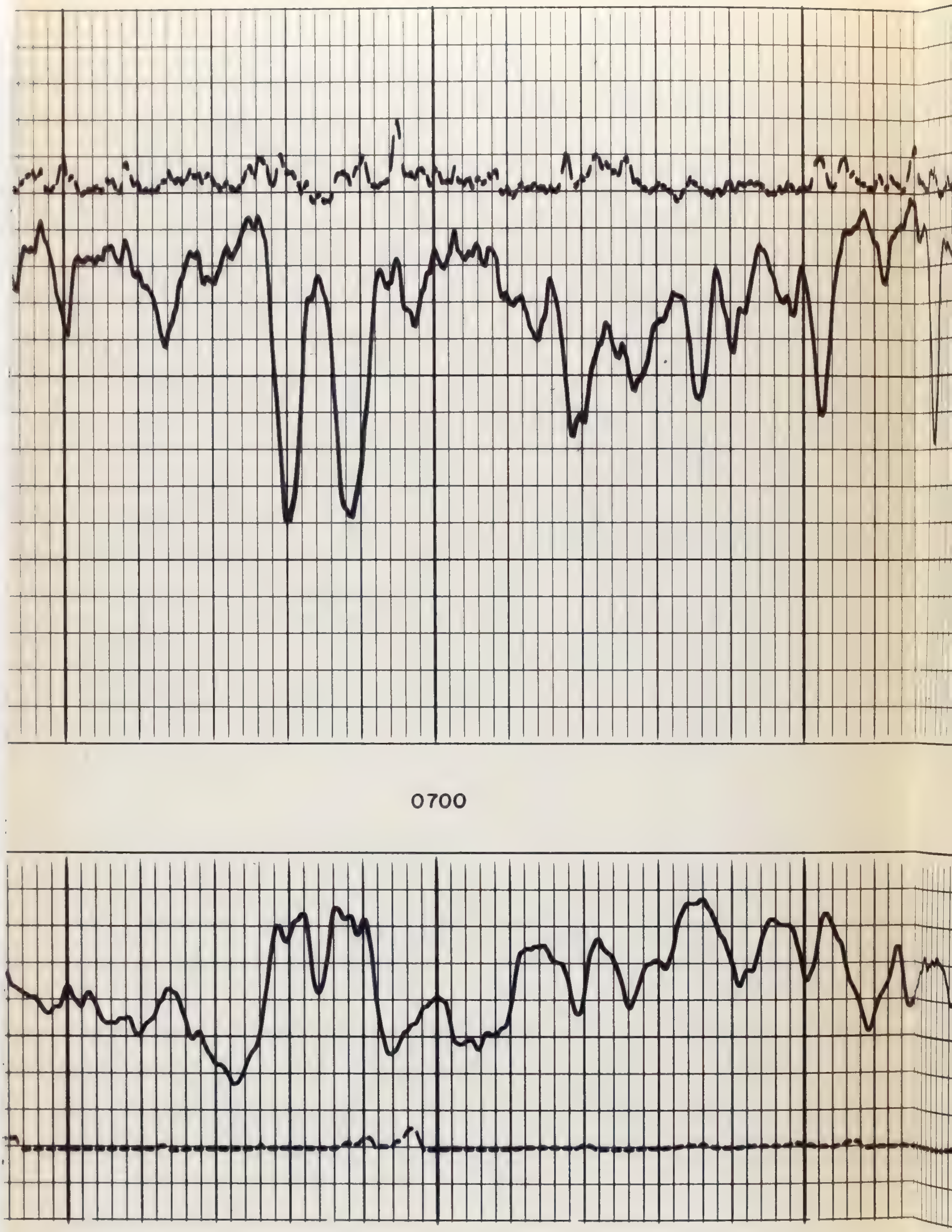

0300
040

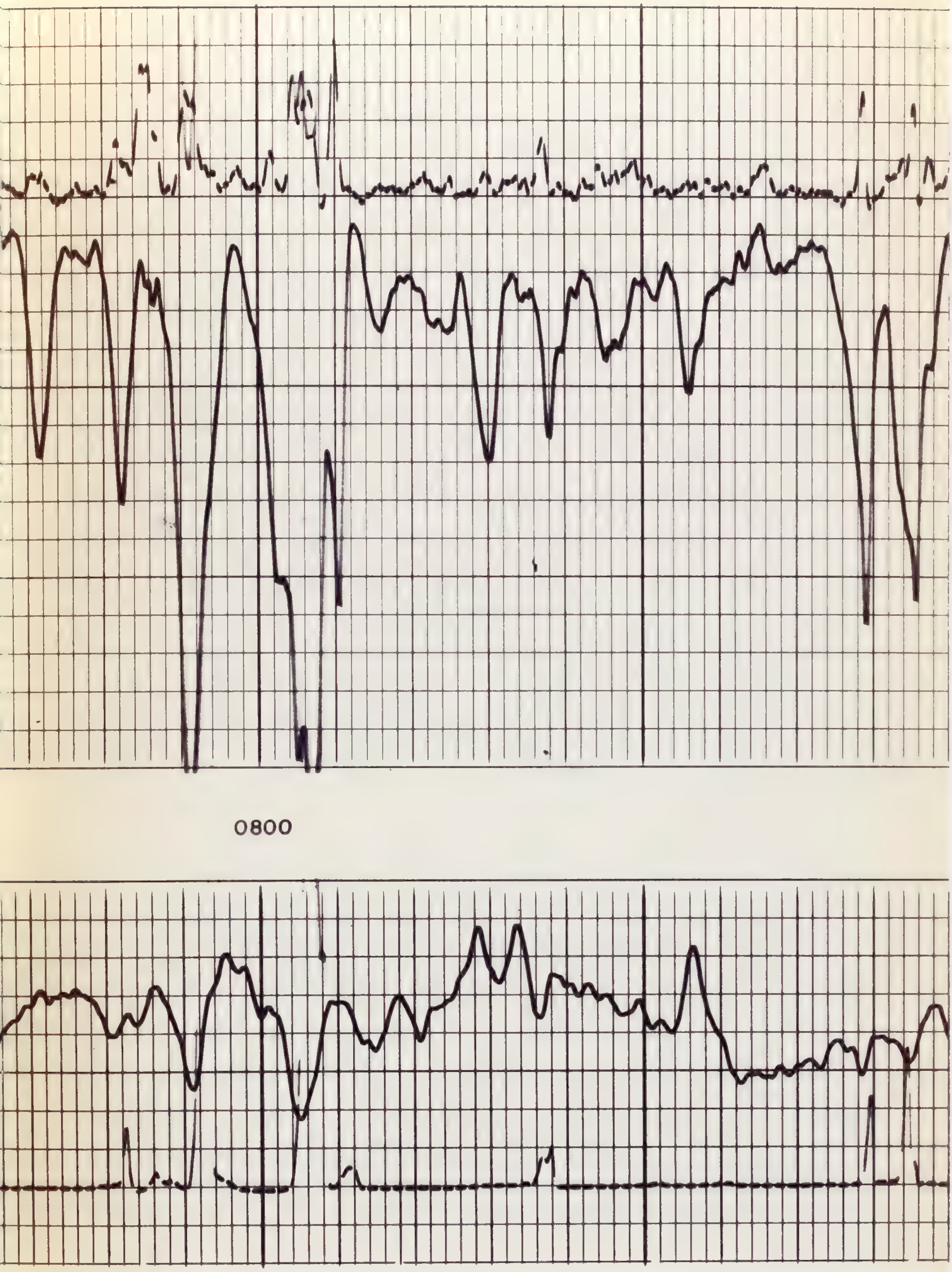

0500

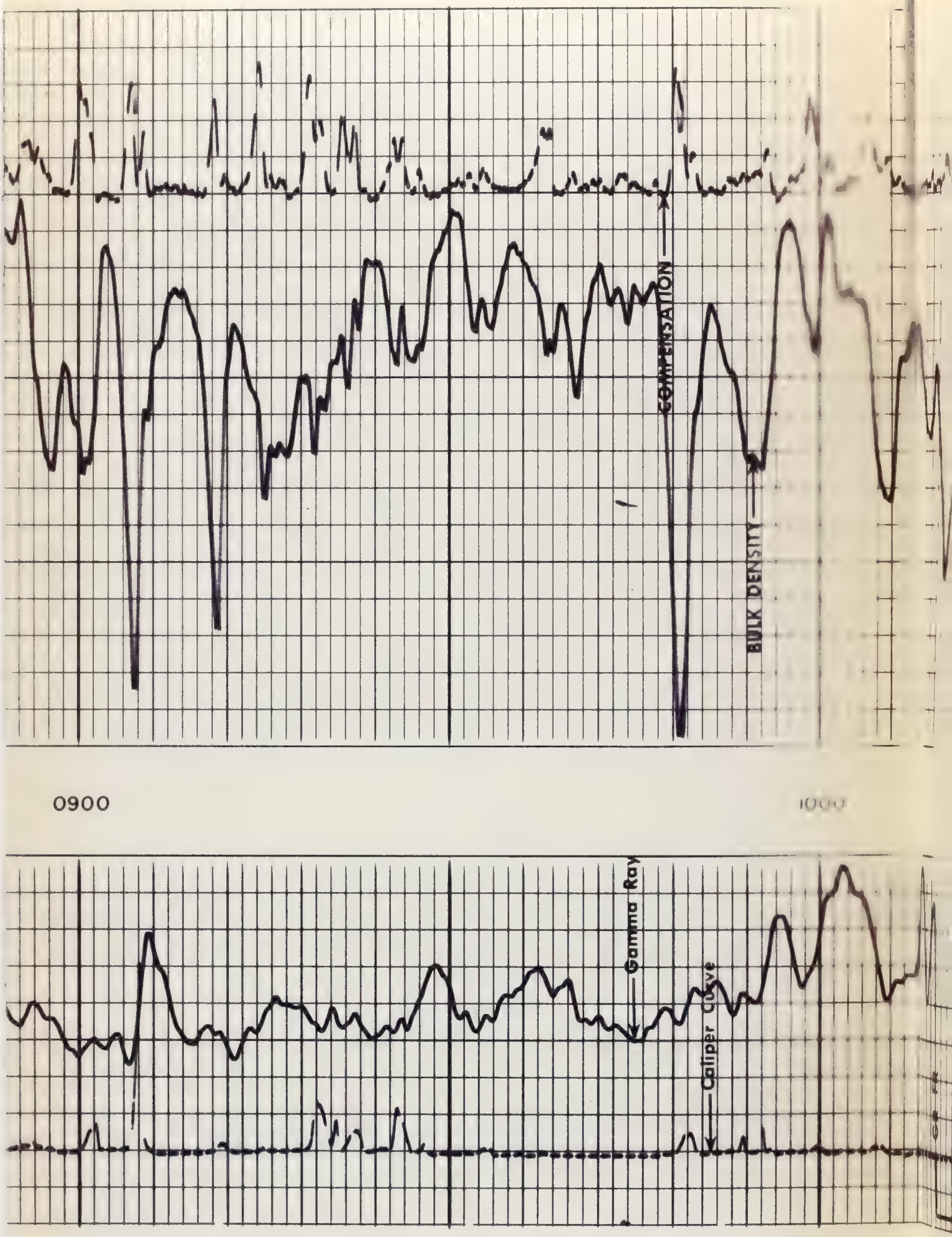


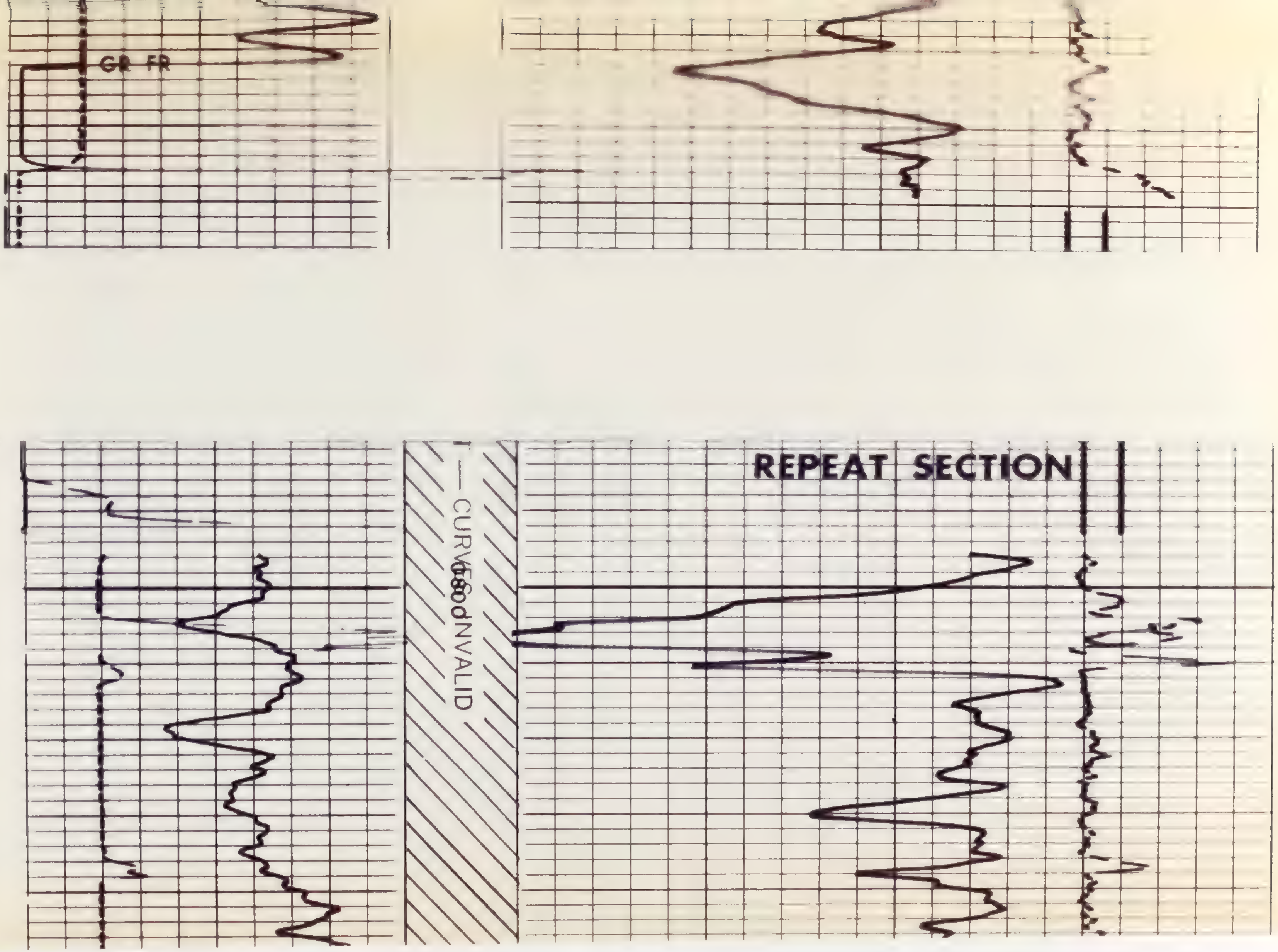
0600

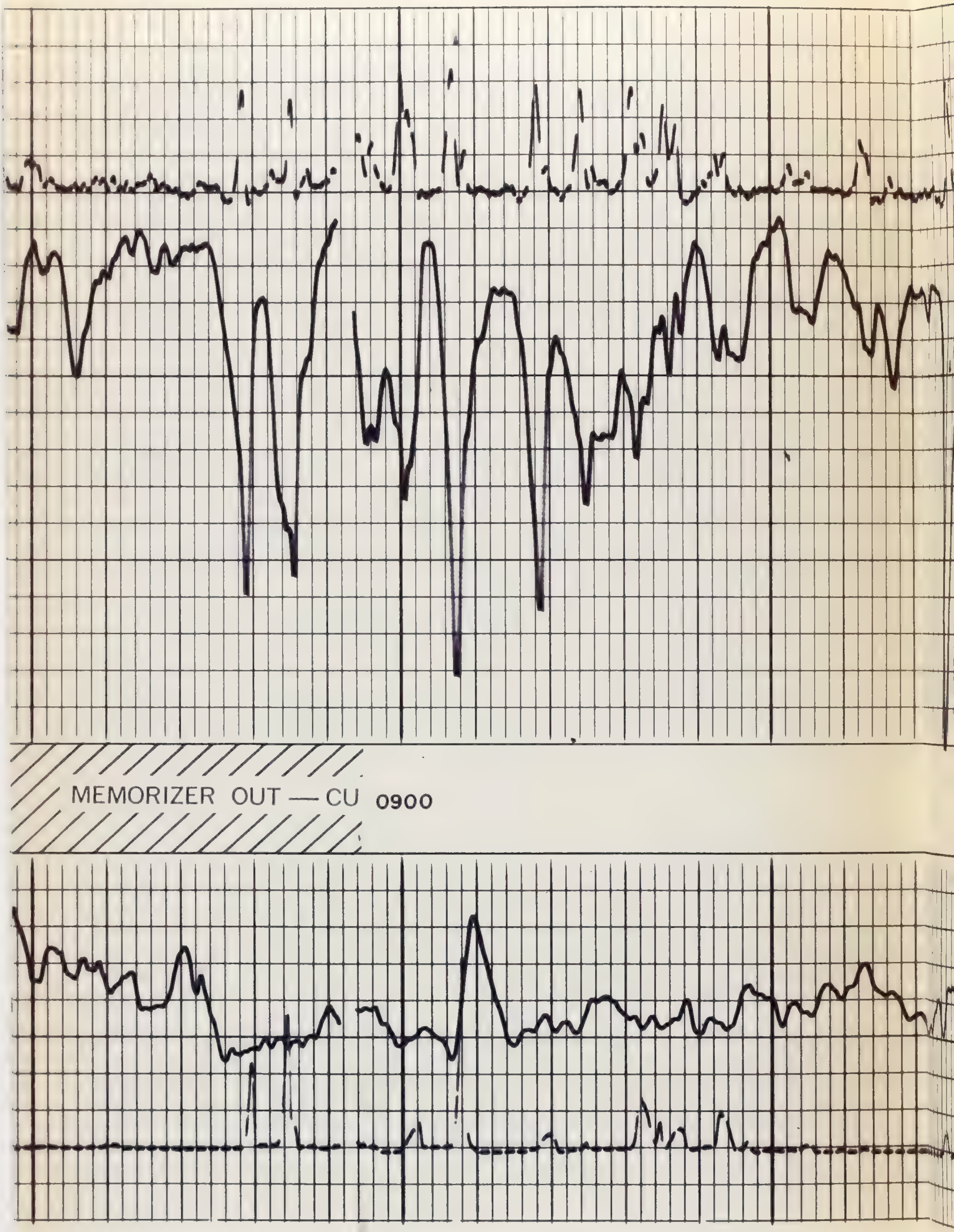


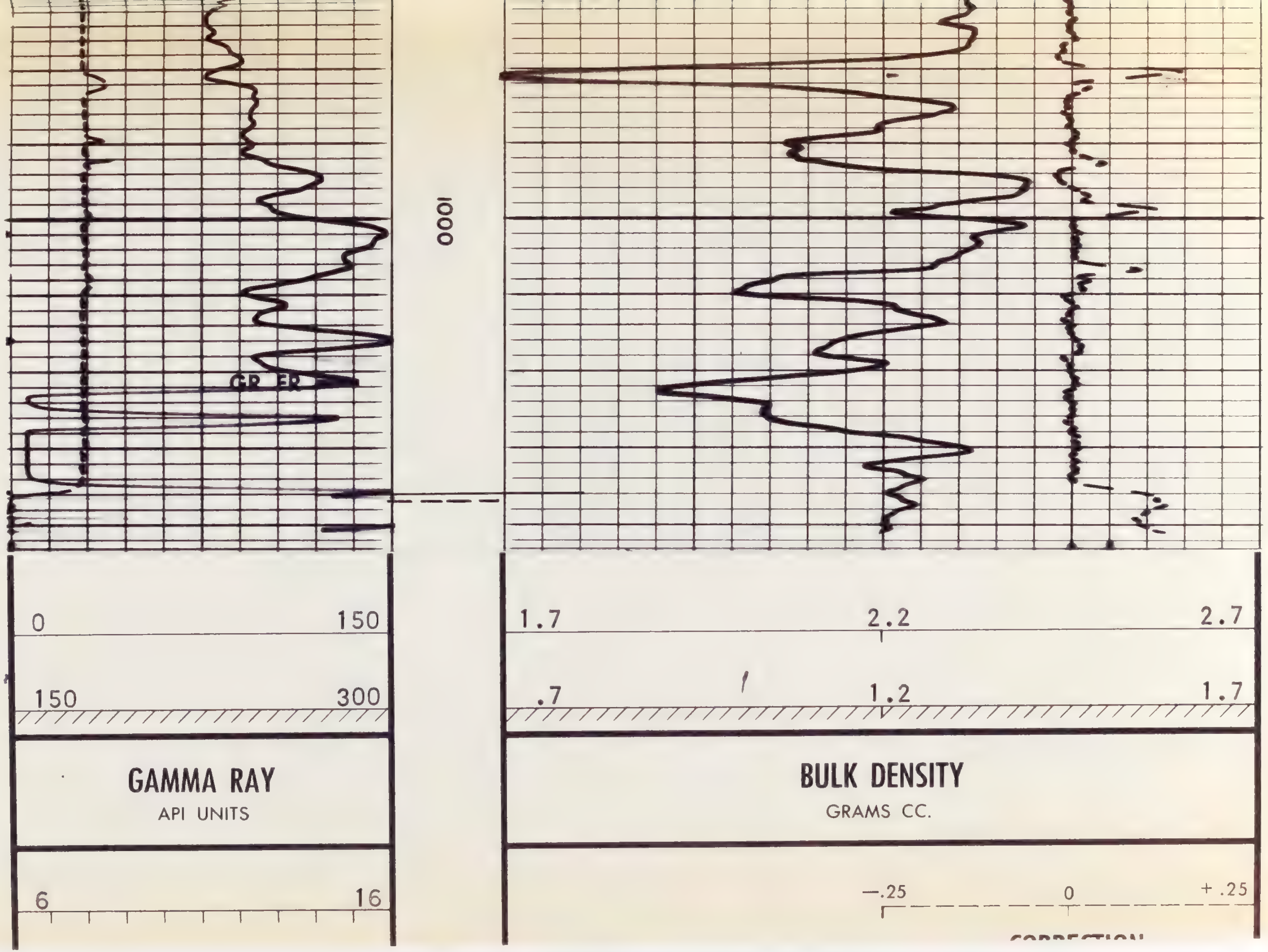

0700


0800


COMPENSATION
BULK DENSITY
0900
1000
Gamma Ray
Caliper Curve


GR FR
REPEAT SECTION
CURVES INVALID
0800


MEMORIZER OUT — CU 0900


1000
GR ER
0
150
150
300
GAMMA RAY
API UNITS
6
16
1.7
2.2
2.7
.7
1.2
1.7
BULK DENSITY
GRAMS CC.
−.25
0
+.25

CALIPER

HOLE DIAM. IN INCHES

DEPTHS

CORRECTION

GRAMS CC.

COMPANY ATLANTIC RICHFIELD

WELL SORGHUM GULCH NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Rm ________ @ ________ °F

BHT ________ °F

SCHL. FR 1036

SCHL. TD 1037

DRLR TD 1036

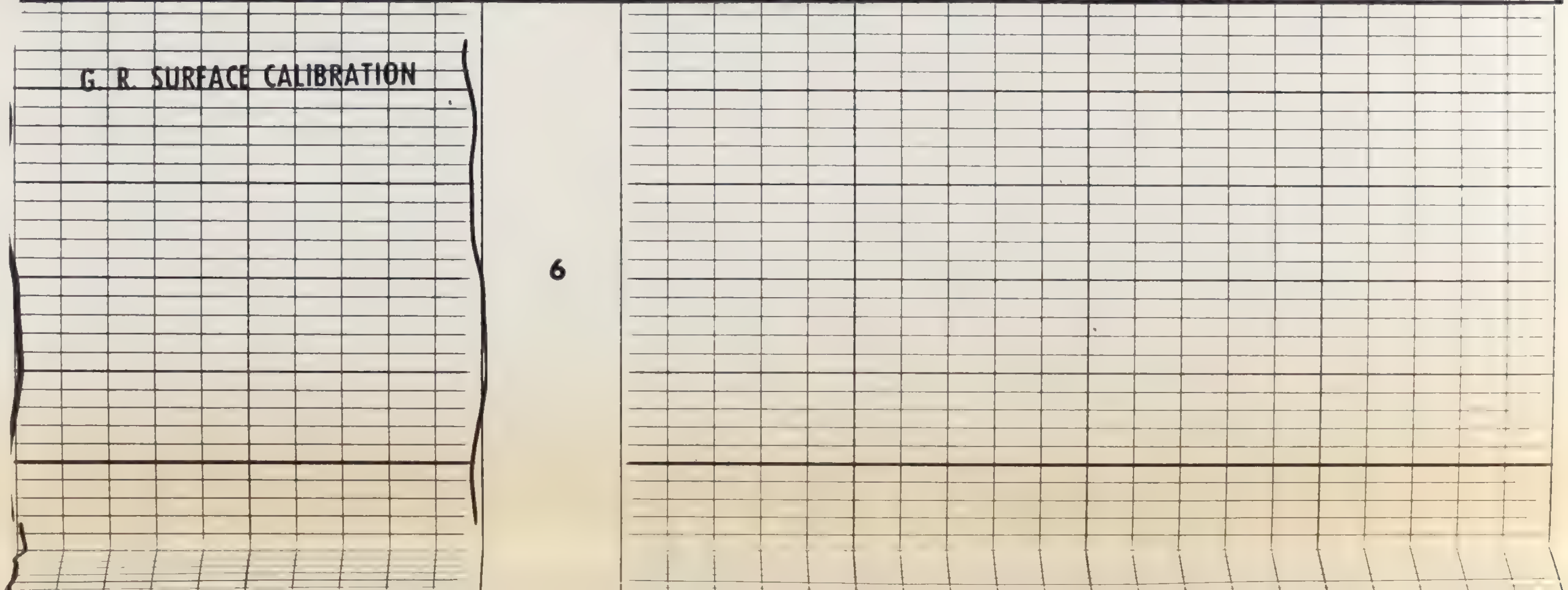
Elev:

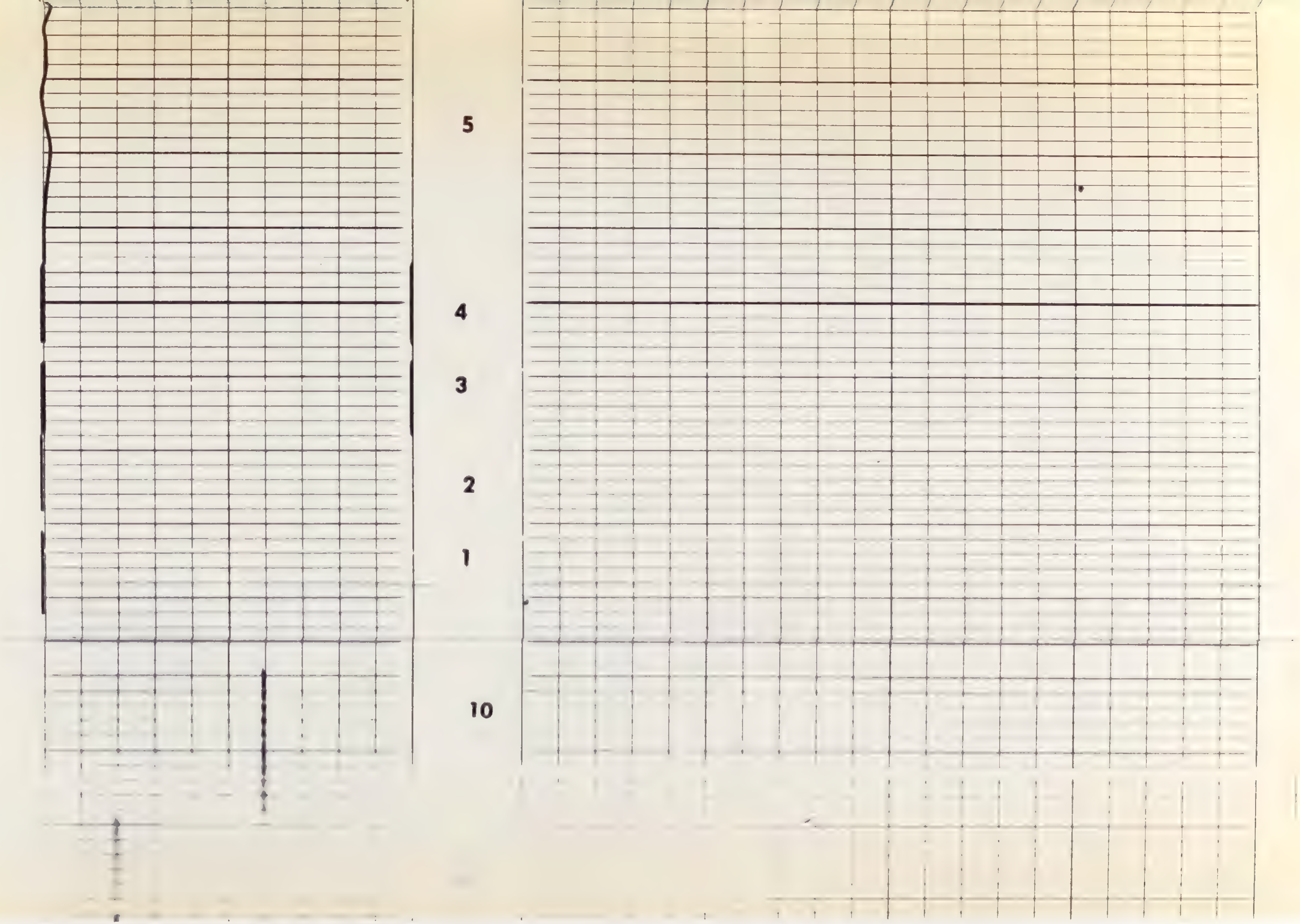
KB 6819

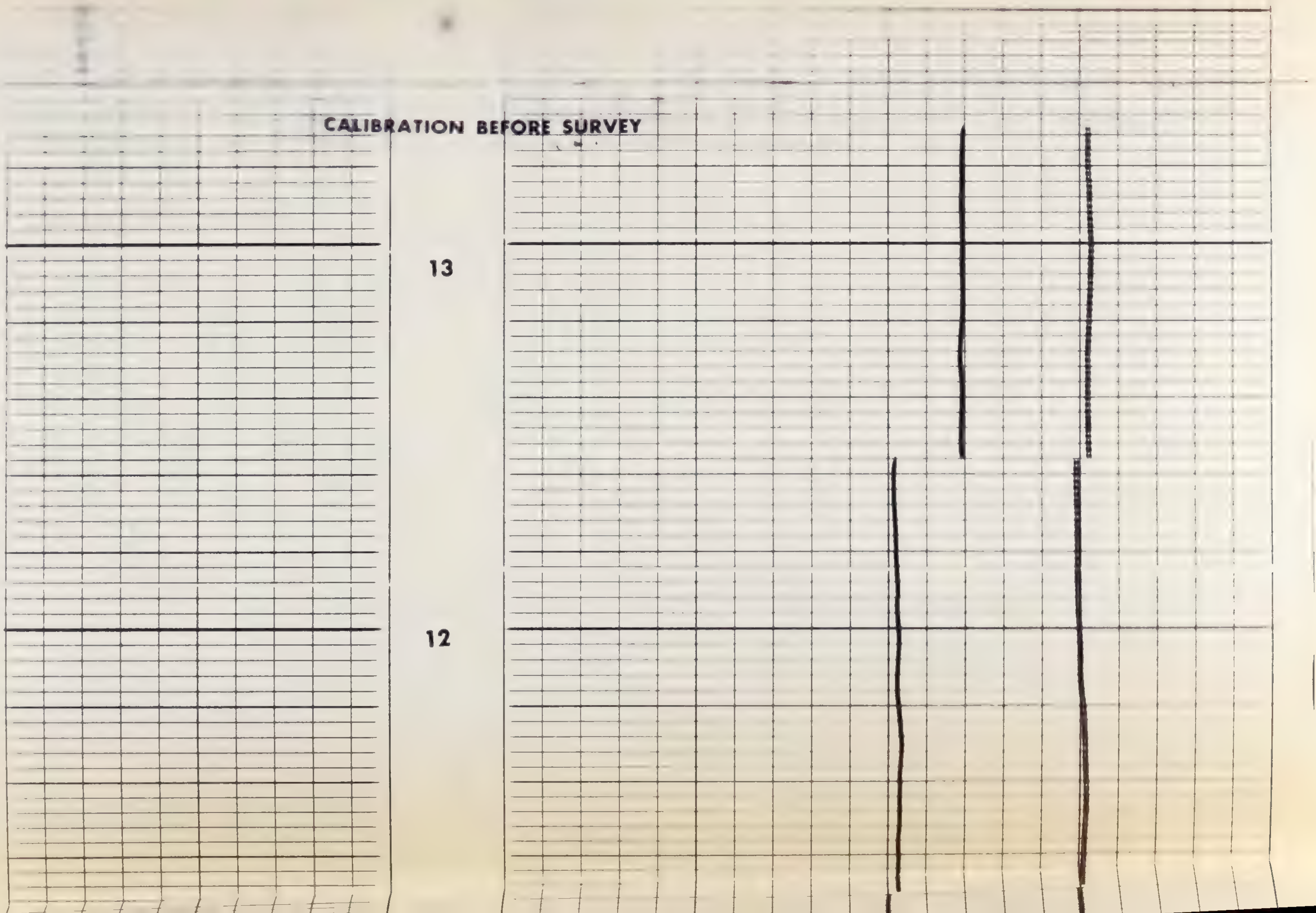
DF 6818

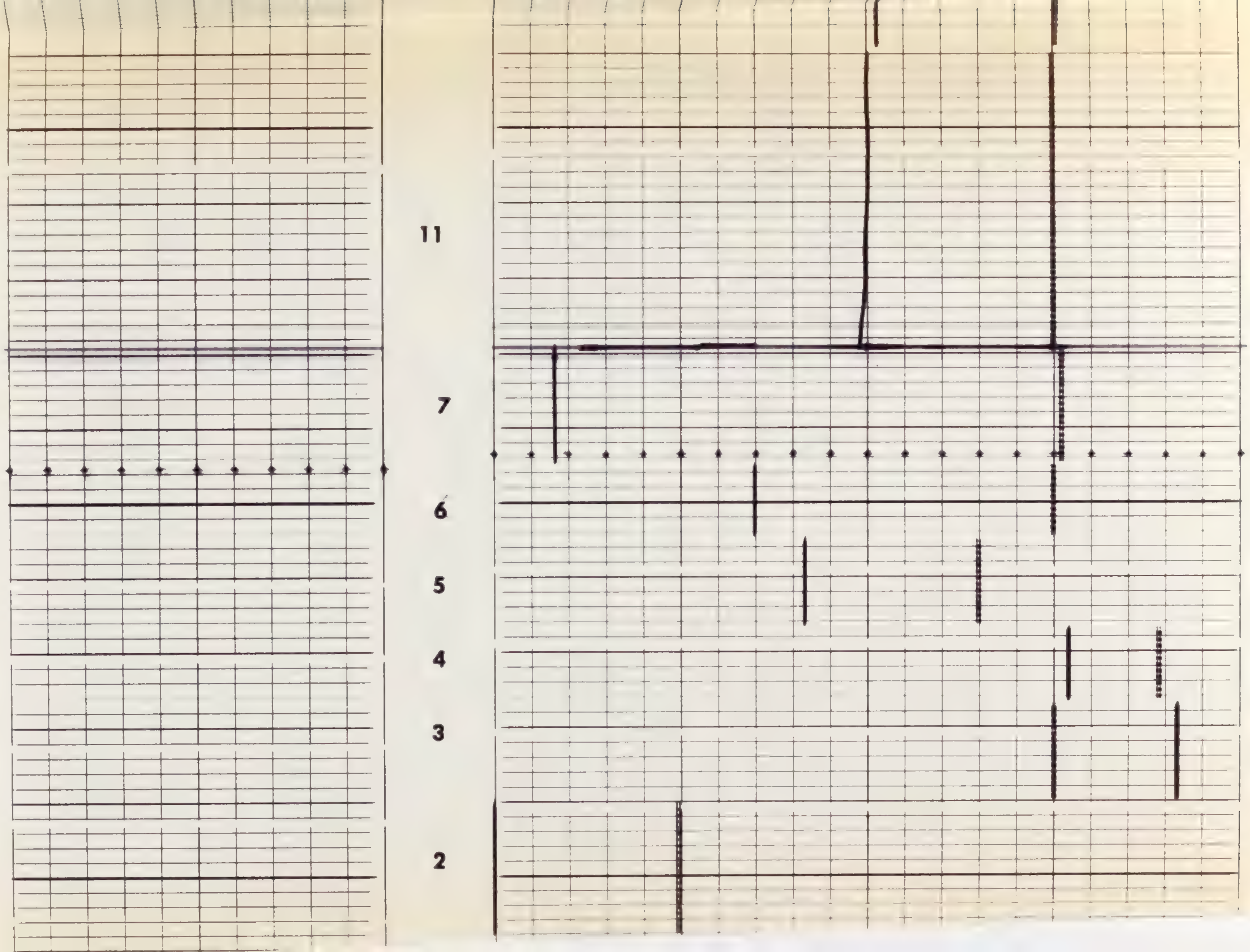
GL 6811

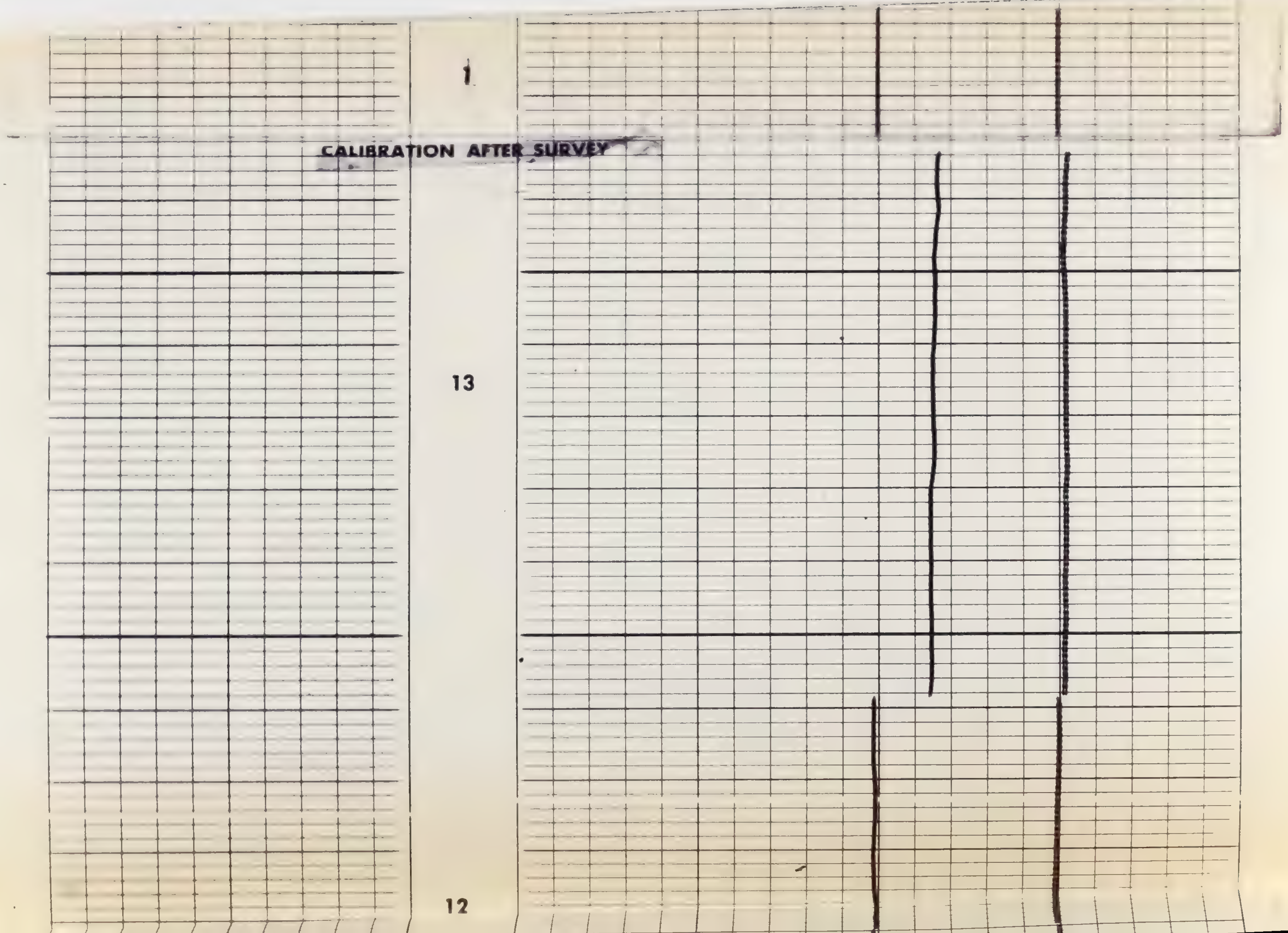
CALIBRATION RECORD

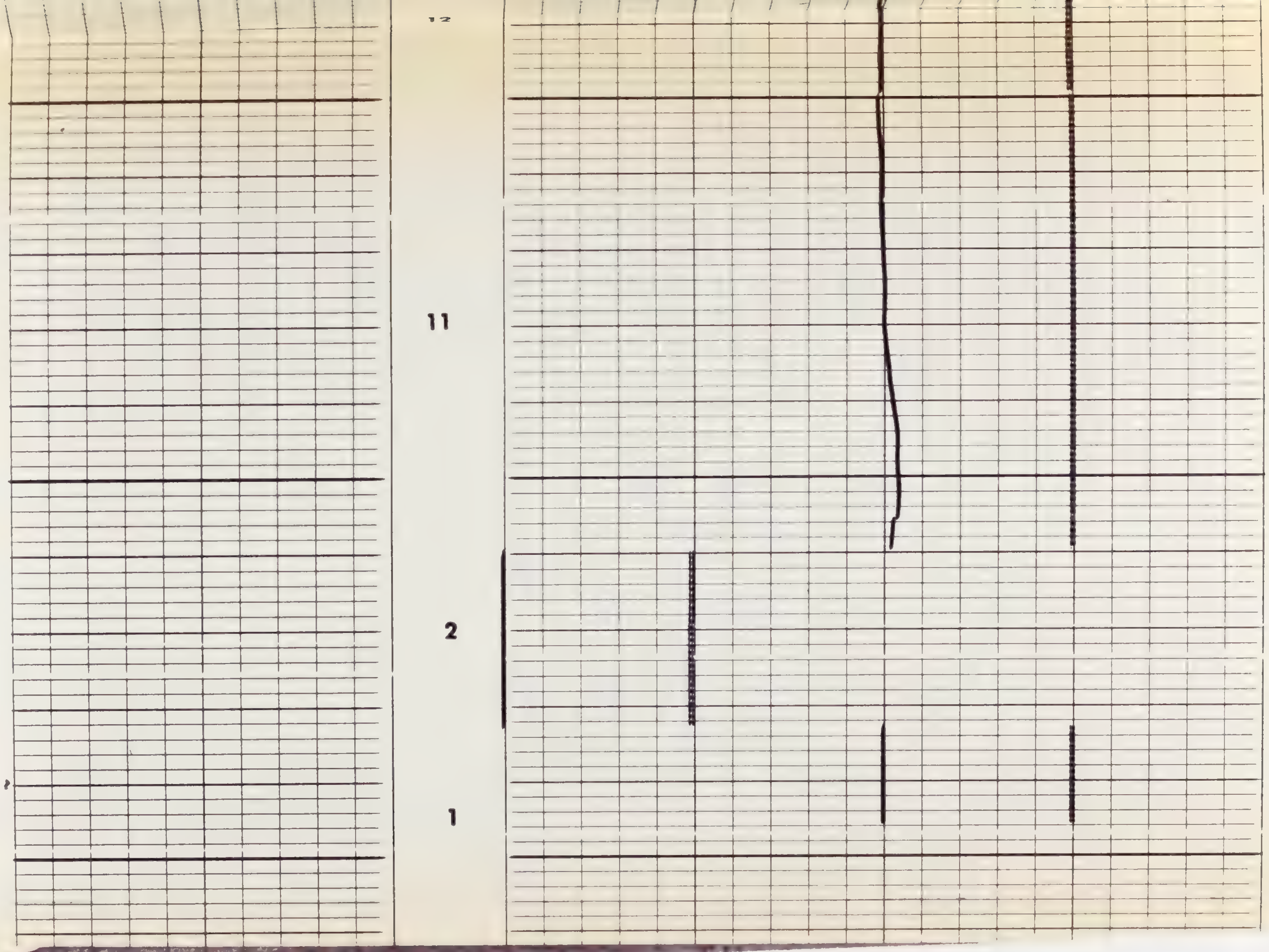


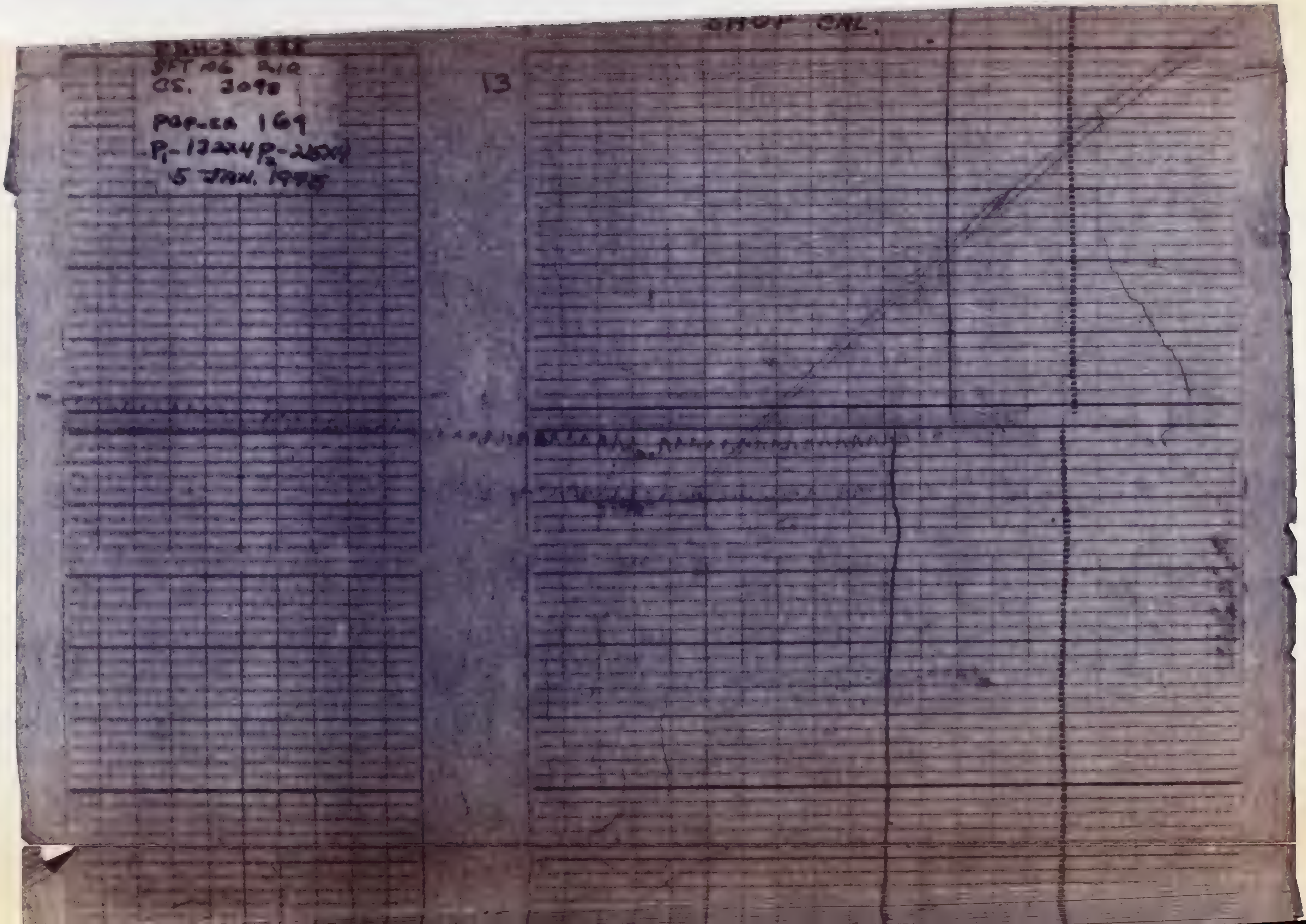

5
4
3
2
1
10


CALIBRATION BEFORE SURVEY
13
12


11
7
6
5
4
3
2


1
CALIBRATION AFTER SURVEY
13
12


12
11
2
1

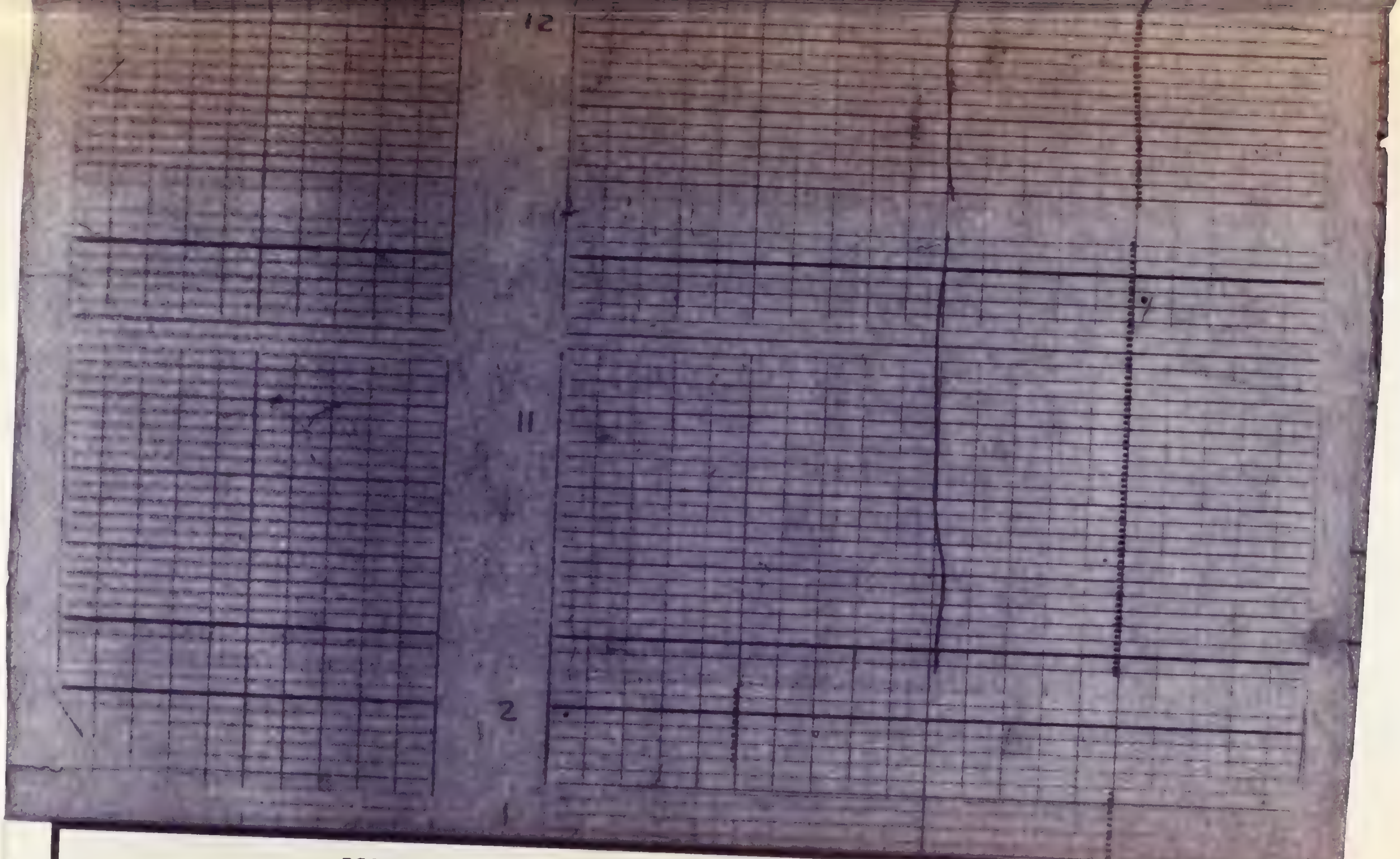


SHOT CAL.

13

SFT 06 2/2
CS. 3098

POP-EA 169
P_1-132x4 P_2-215x4
5 JAN. 1975



FORMATION DENSITY COMPENSATED CALIBRATION CODING

1. MECHANICAL ZERO
2. RECORDER SENSITIVITY

PANEL TEST

FDC LIQUID

	POS	ρ	$\Delta\rho$
3.	# 1	2.92	.00
4.	# 2	2.78	+.14
5.	# 3	2.42	−.10
6.	# 4	2.35	.00
7.	# 5	2.08	.01

8. MECHANICAL ZERO CALIPER
9. 8" RING
10. 12" RING
11. TOOL CALIBRATE # 1 SET $\rho = 2.50$
12. TOOL CALIBRATE # 2 SET $\Delta\rho = .00$
13. LOG POSITION $\rho = 2.59$, $\Delta\rho = .015$

GAMMA RAY CALIBRATION CODING

1. MECHANICAL ZERO
2. ELECTRICAL ZERO
3. RECORDER SENSITIVITY
4. MEMORIZER ADJUSTMENT
5. BACKGROUND
6. CALIBRATE - SOURCE IN PLACE

CALIBRATION RECORD

COMPANY ATLANTIC RICHFIELD

WELL SORGHUM GULCH NO. 21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

Rm ______ @ ______ °F

BHT ______ °F

SCHL. FR 1036

SCHL. TD 1037

DRLR TD 1036

Elev:

KB 6819

DF 6818

GL 6811

COUNTY

Per
Log
Dri

Dat
Run
Dep
Dep
Btm.
Top
Casi
Casi
Casi
Casi
Casi
Bit S
Typ
D
Tim
BHT
Ec
Rec
Wi

SG-21

Schlumberger

TEMPERATURE LOG

COUNTY RIO BLANCO
FIELD or LOCATION SORGHUM GULCH
SORGHUM GULCH
WELL 21
COMPANY ATLANTIC RICHFIELD

COMPANY ATLANTIC RICHFIELD COMPANY

WELL SORGHUM GULCH #21

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

LOCATION
210.0' FSL & 1528.0' FEL

Sec. 13 Twp. 3S Rge. 97W

Other Services:

Permanent Datum: GL ; Elev.: 6811
Log Measured From GL , 0 Ft. Above Perm. Datum
Drilling Measured From GL

Elev.: K.B. 6819
D.F. 6818
G.L. 6811

Date	12-22-74		
Run No.	ONE		
Depth—Driller	1036		
Depth—Logger	912		
Btm. Log Interval	912		
Top Log Interval	GL		
Casing—Driller	8 5/8 @ 140	@	@
Casing—Logger			
Casing Size 1	8 5/8 To 140	To	To
2	To	To	To
Casing Weight 1	NA		
2			
Casing Thickness 1	NA		
2			
Bit Size 1	7-7/8 To 690	To	To
2	6-3/4 To TD	To	To
Type Fluid in Hole	WATER		
Dens. | Visc.	NA |	|	|
Time Since Circ.			
BHT			
Equip. | Location	7083 | VERNAL	|	|
Recorded By	LANGLEY		
Witnessed By	BURNS		

FOLD HERE The well name, location and borehole reference data were furnished by the customer.

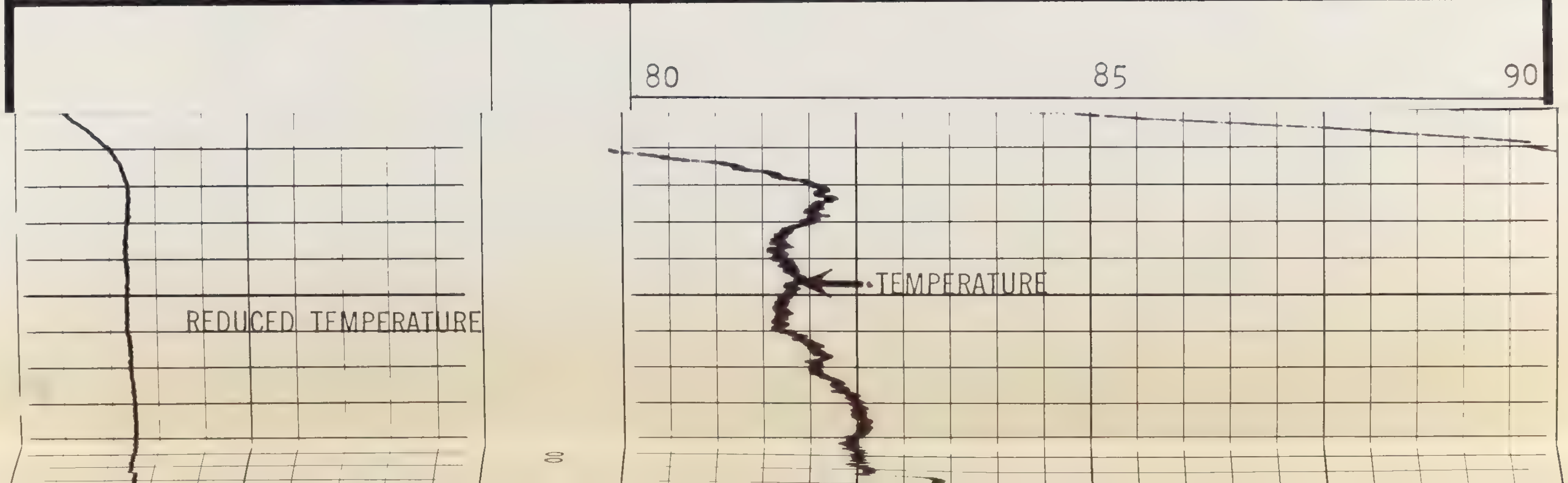
REMARKS:

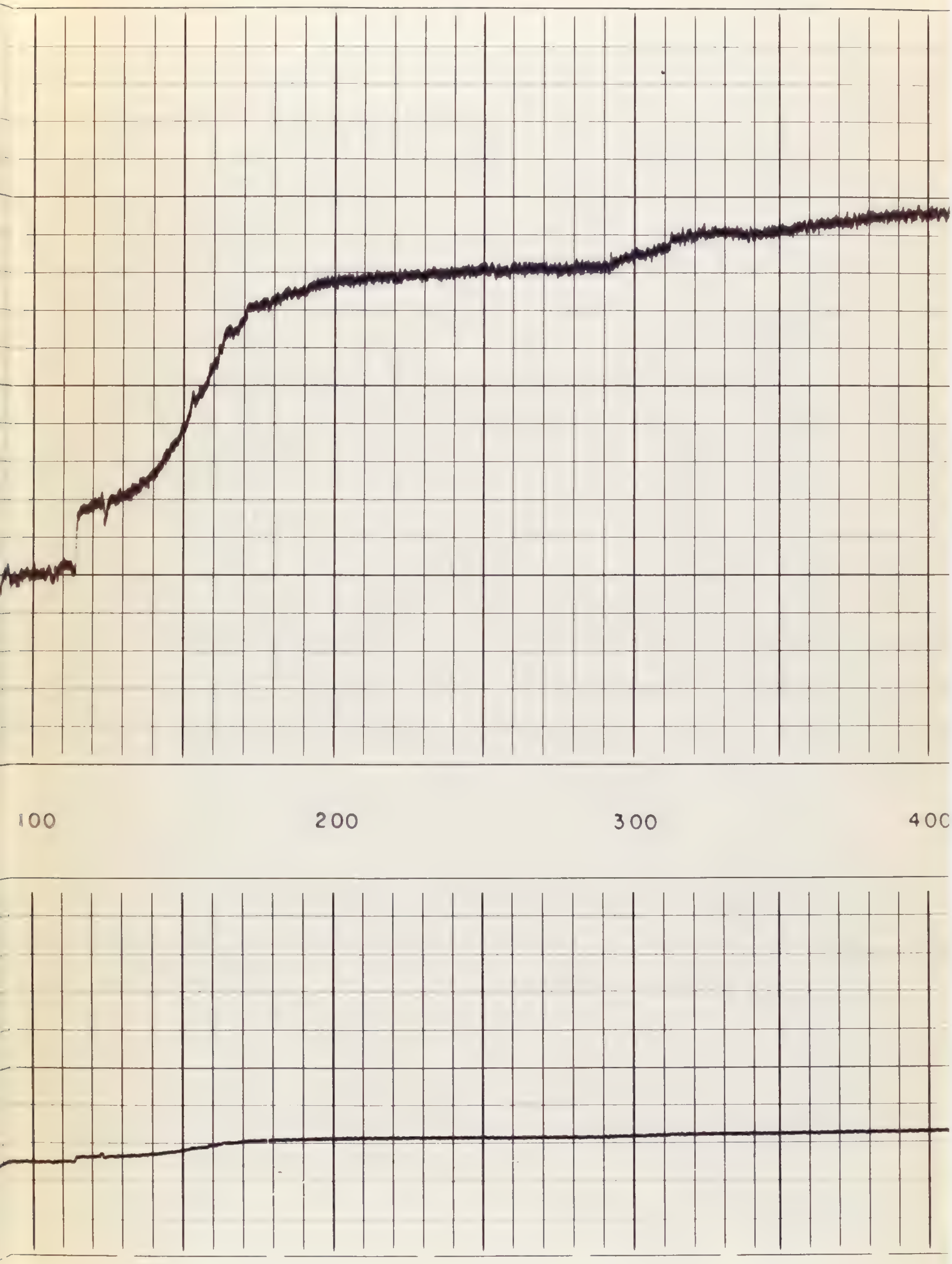
CEMENTATION DATA

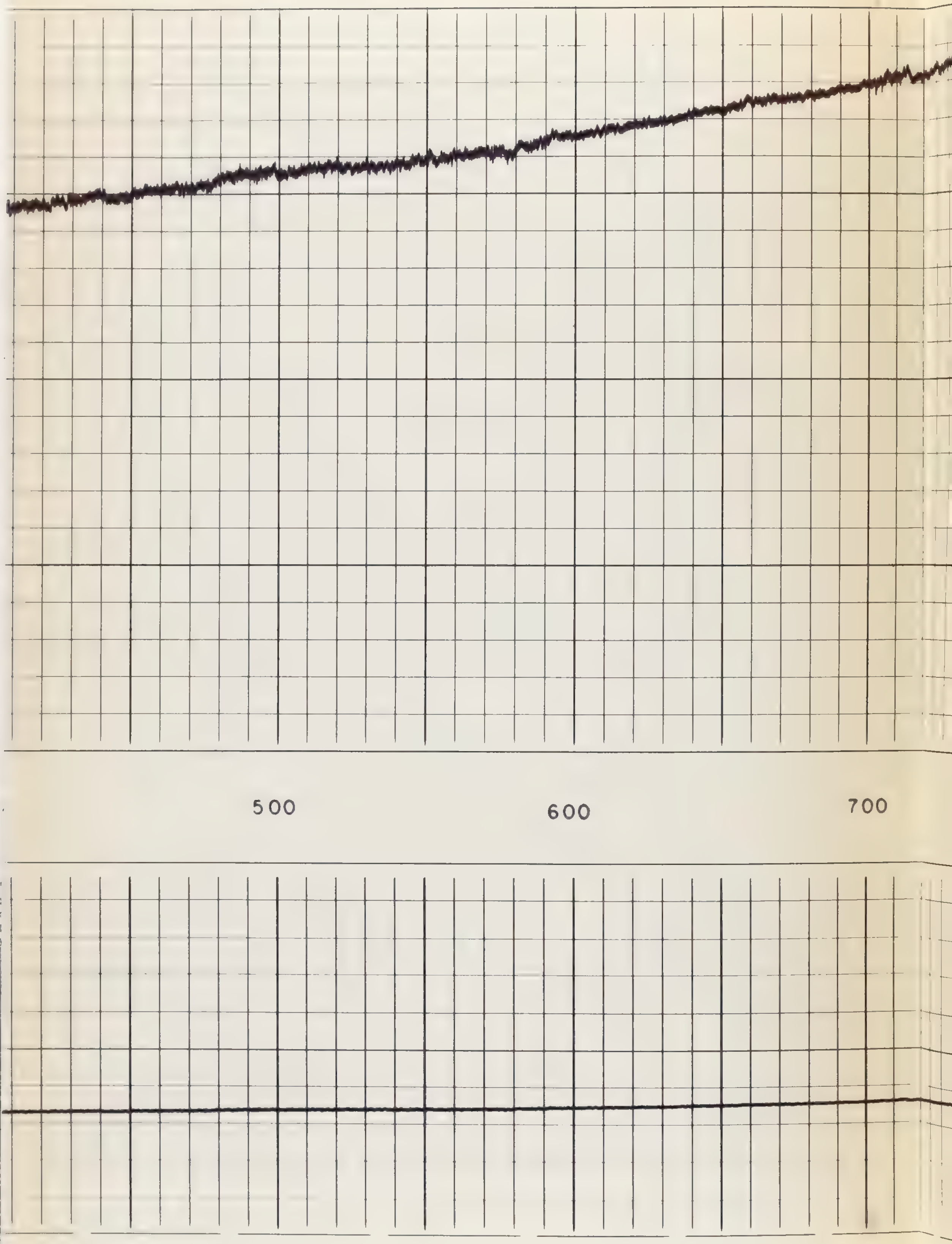
Date	Depth	Type of Cement	Nb of Sacks	Additives	Calculated Top

REDUCED SENSITIVITY
TEMPERATURE

TEMPERATURE °F.




100
200
300
400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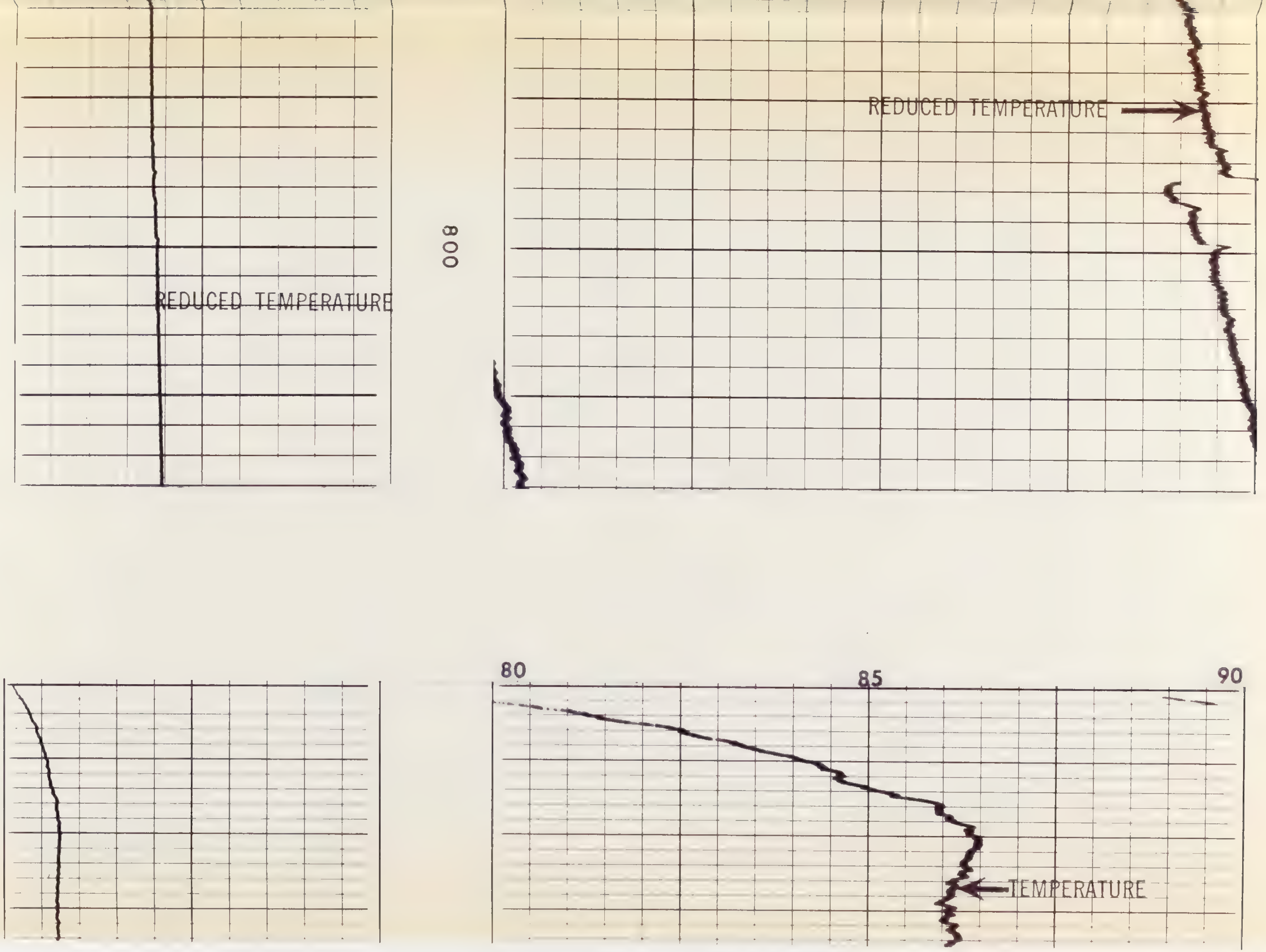
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REDUCED TEMPERATURE
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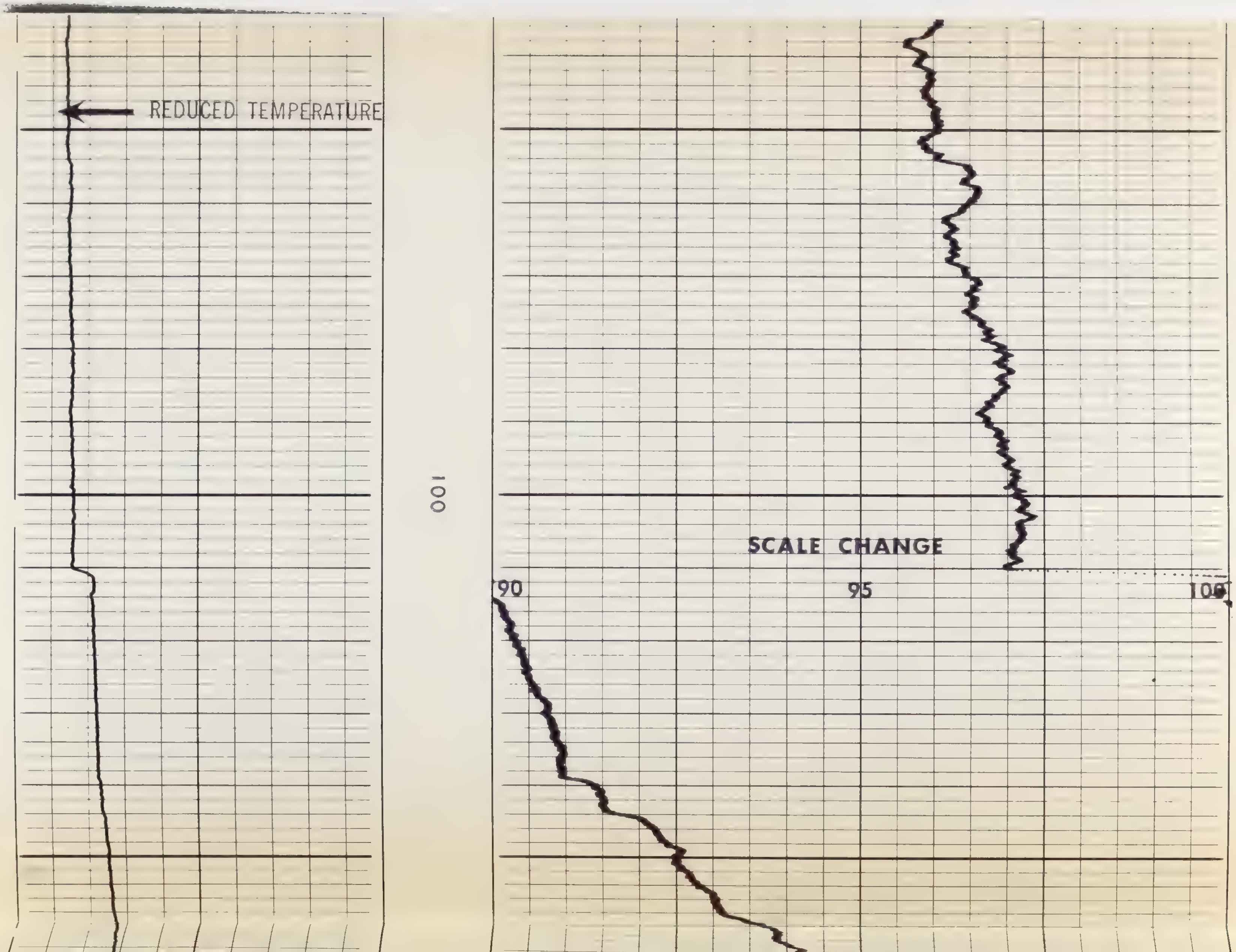
TEMPERATURE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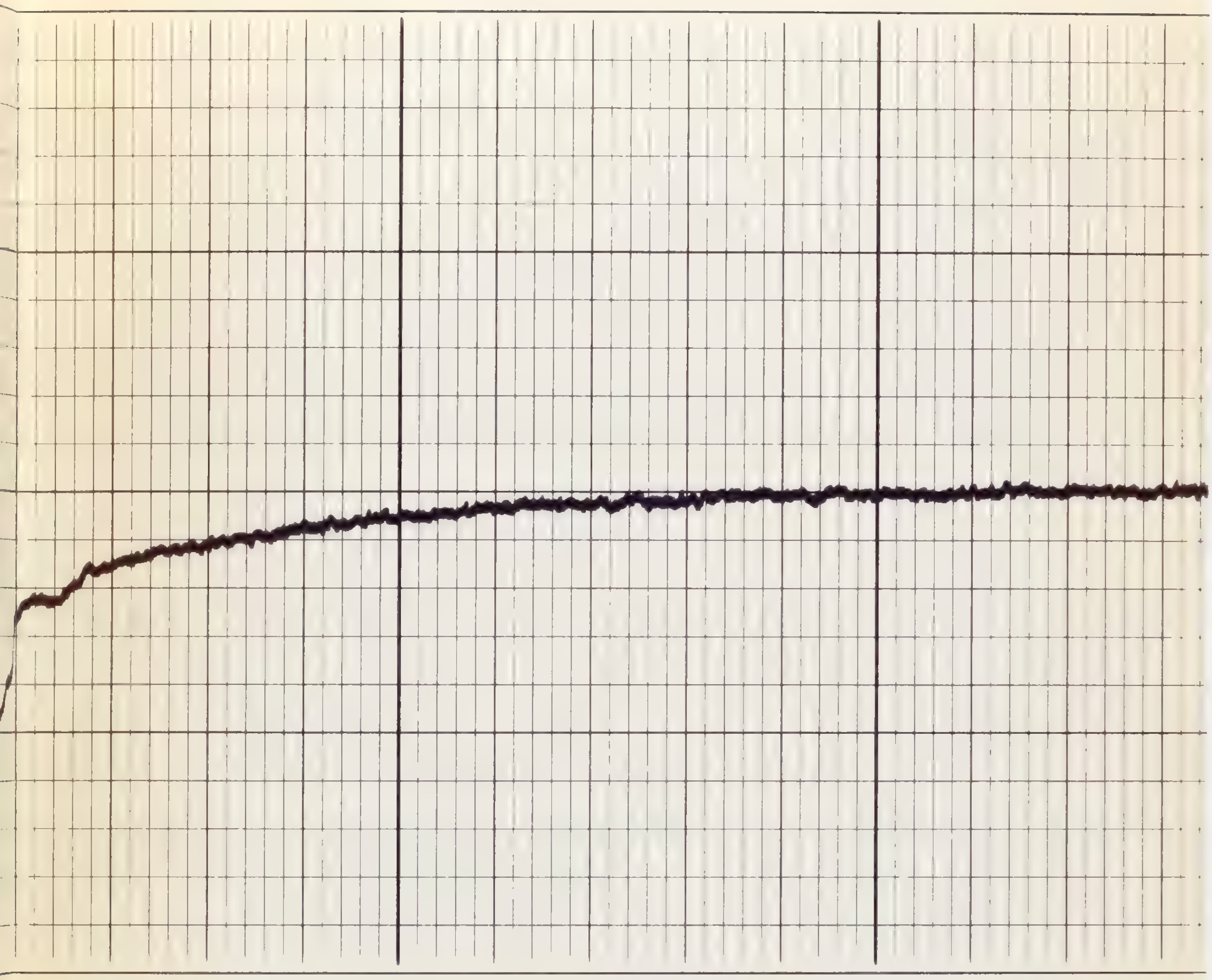

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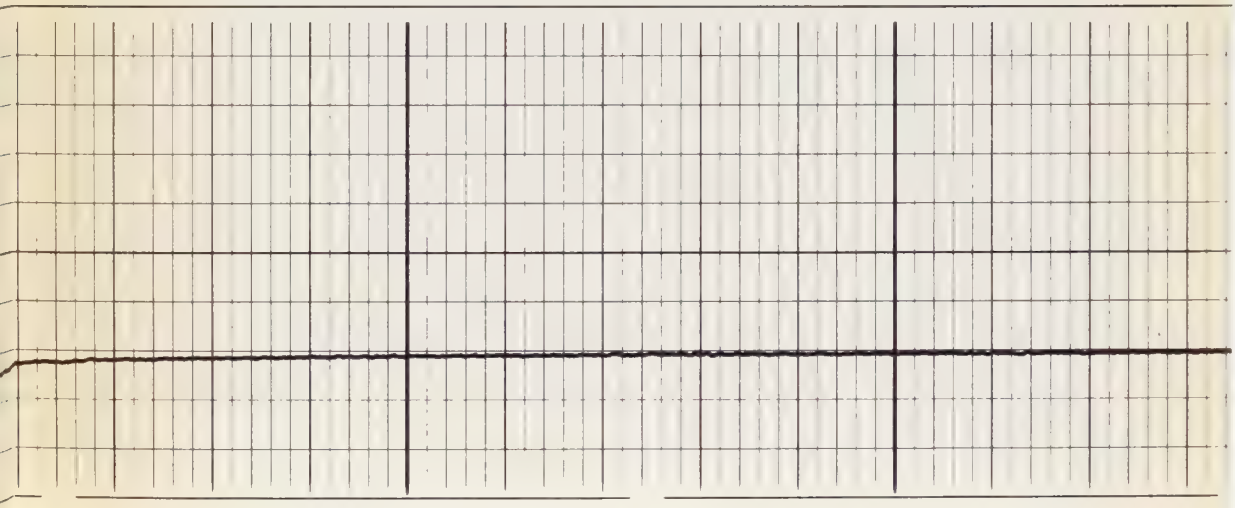

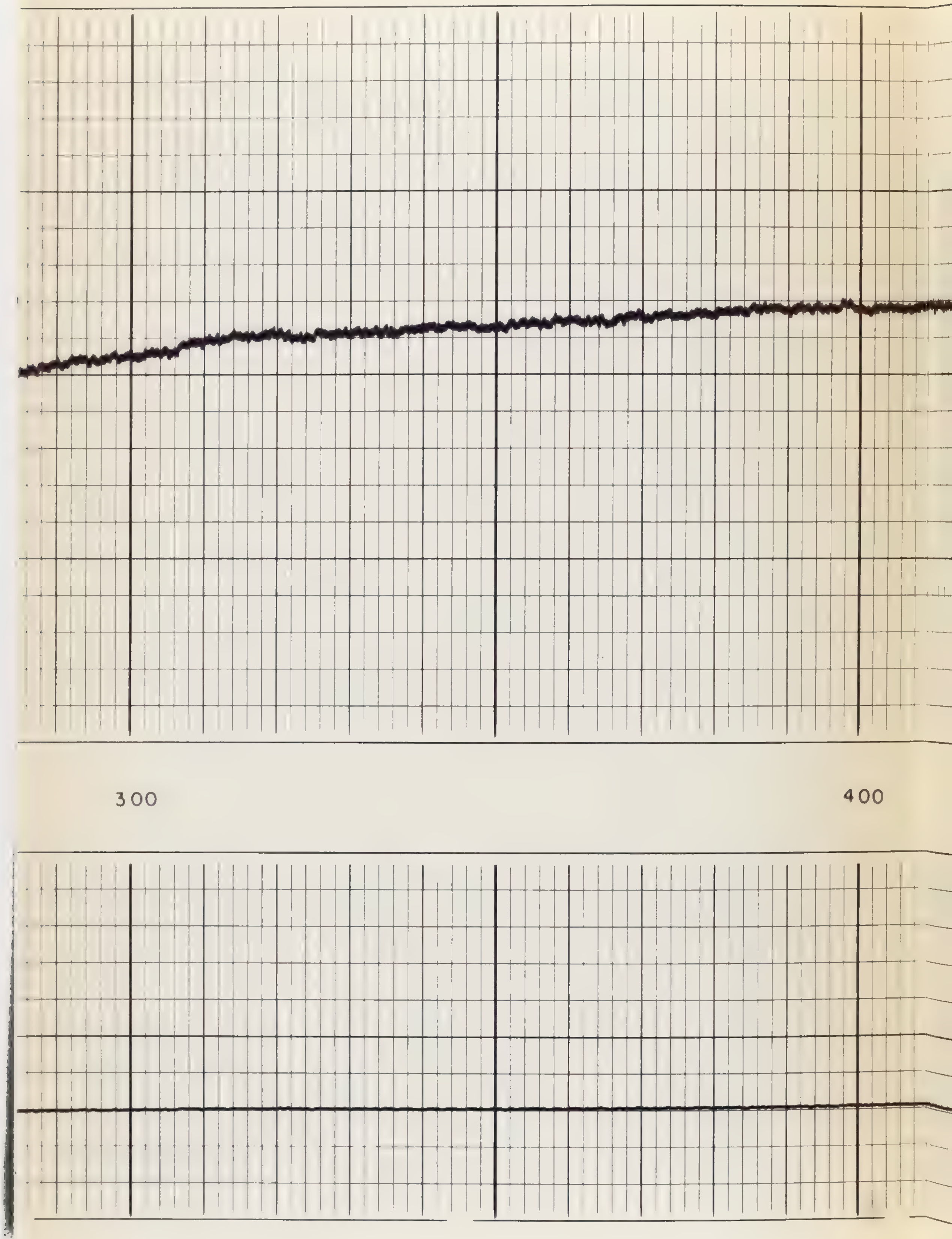
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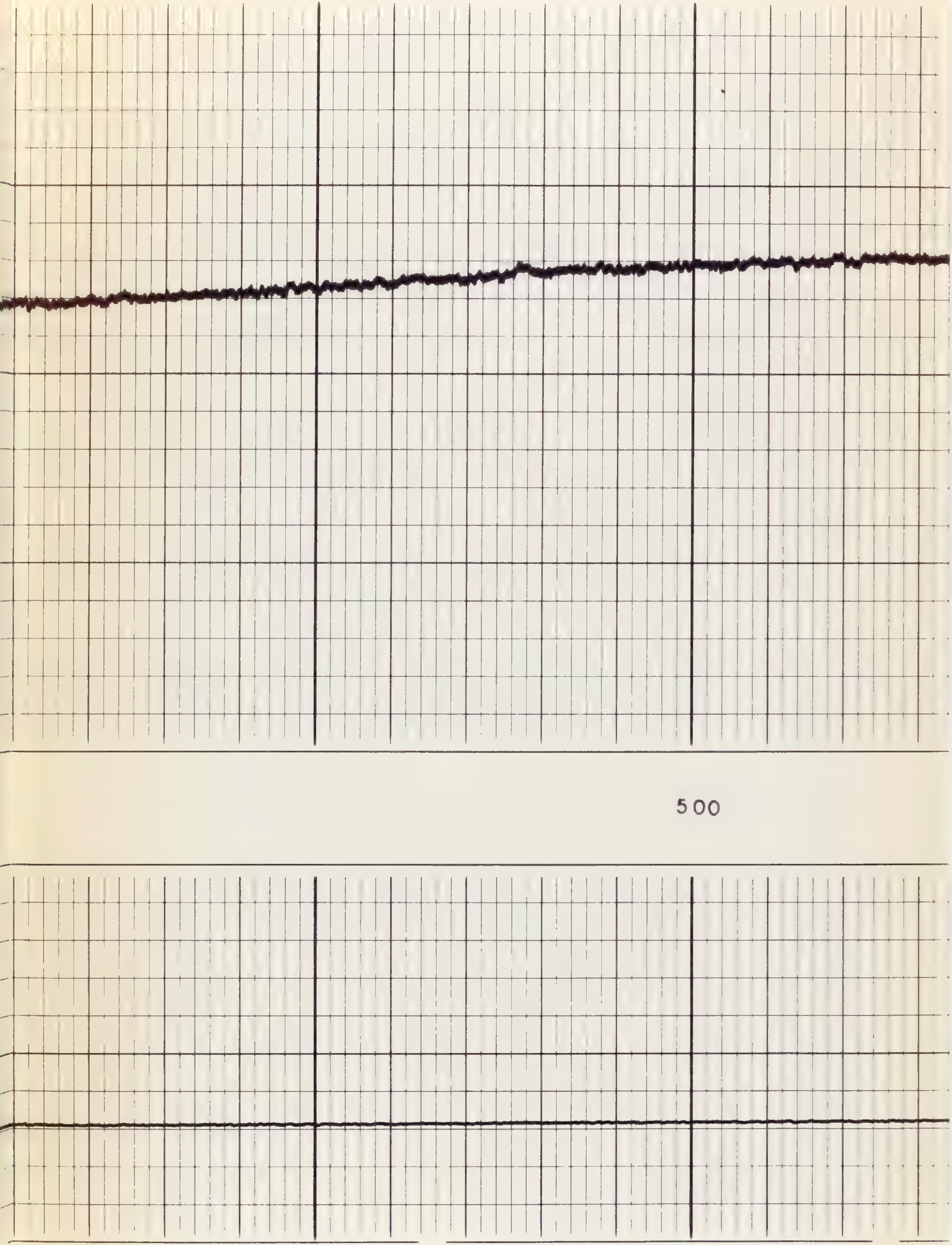
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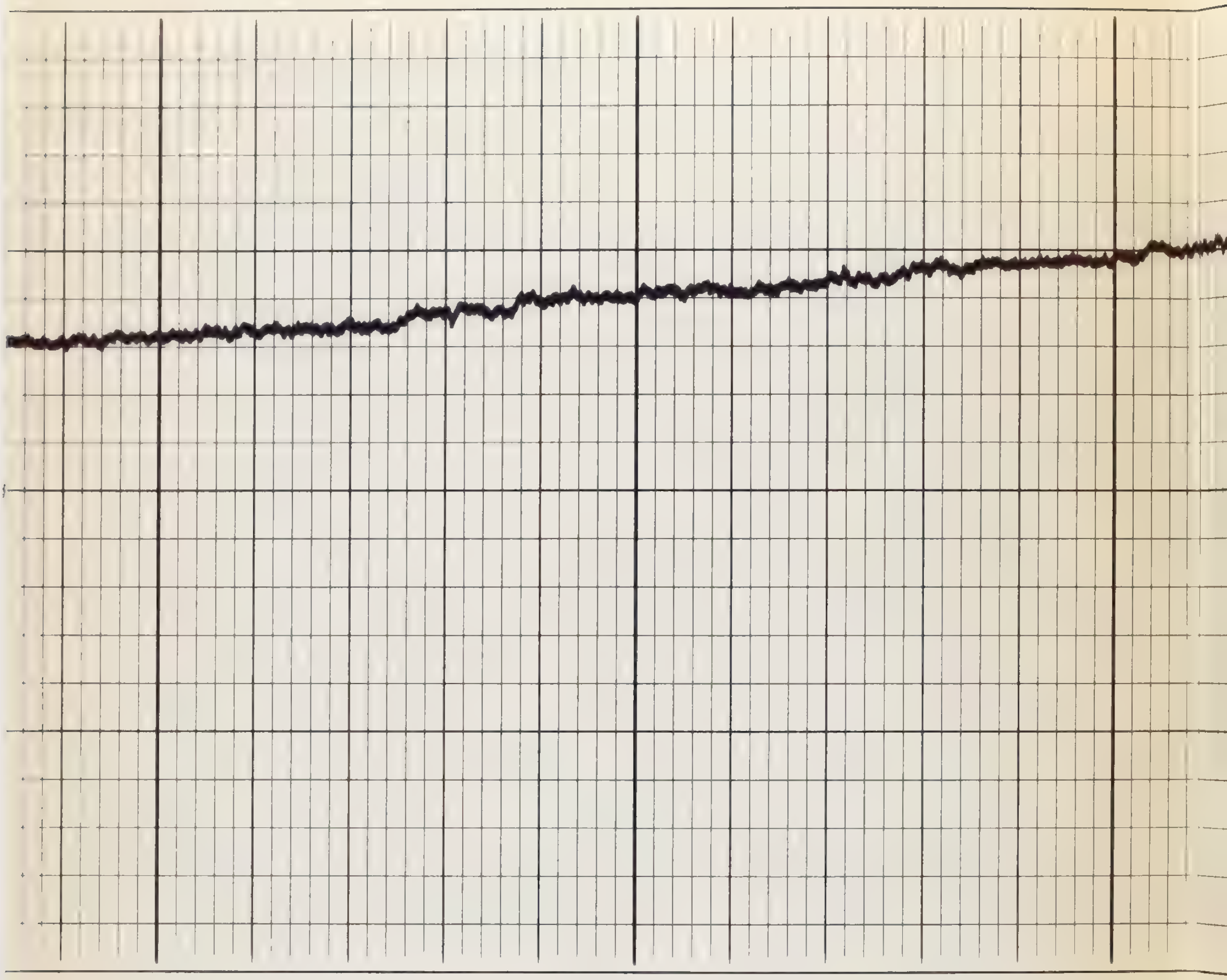

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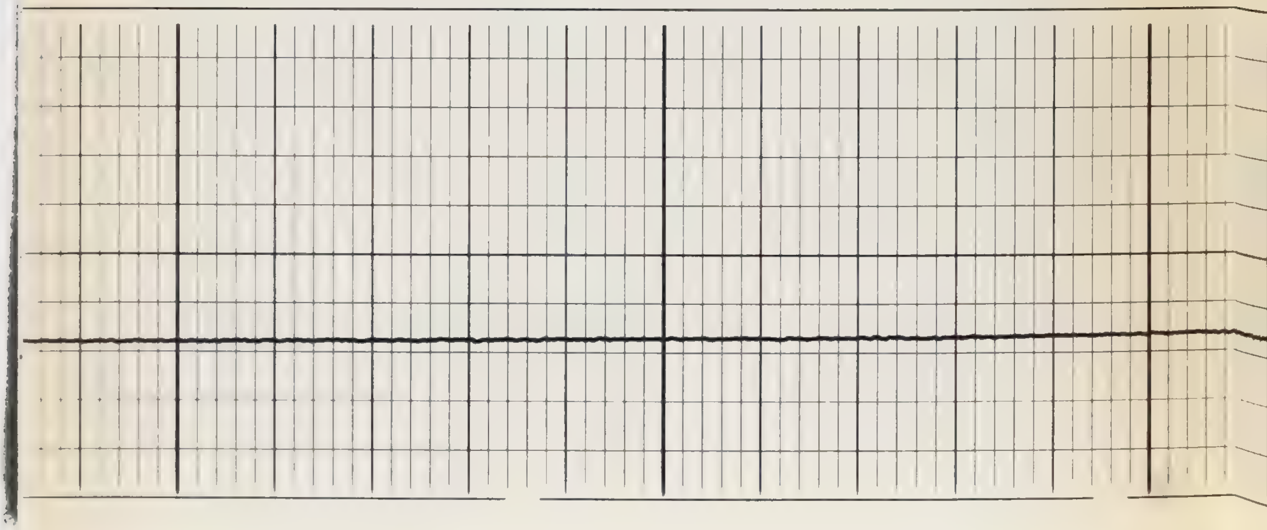

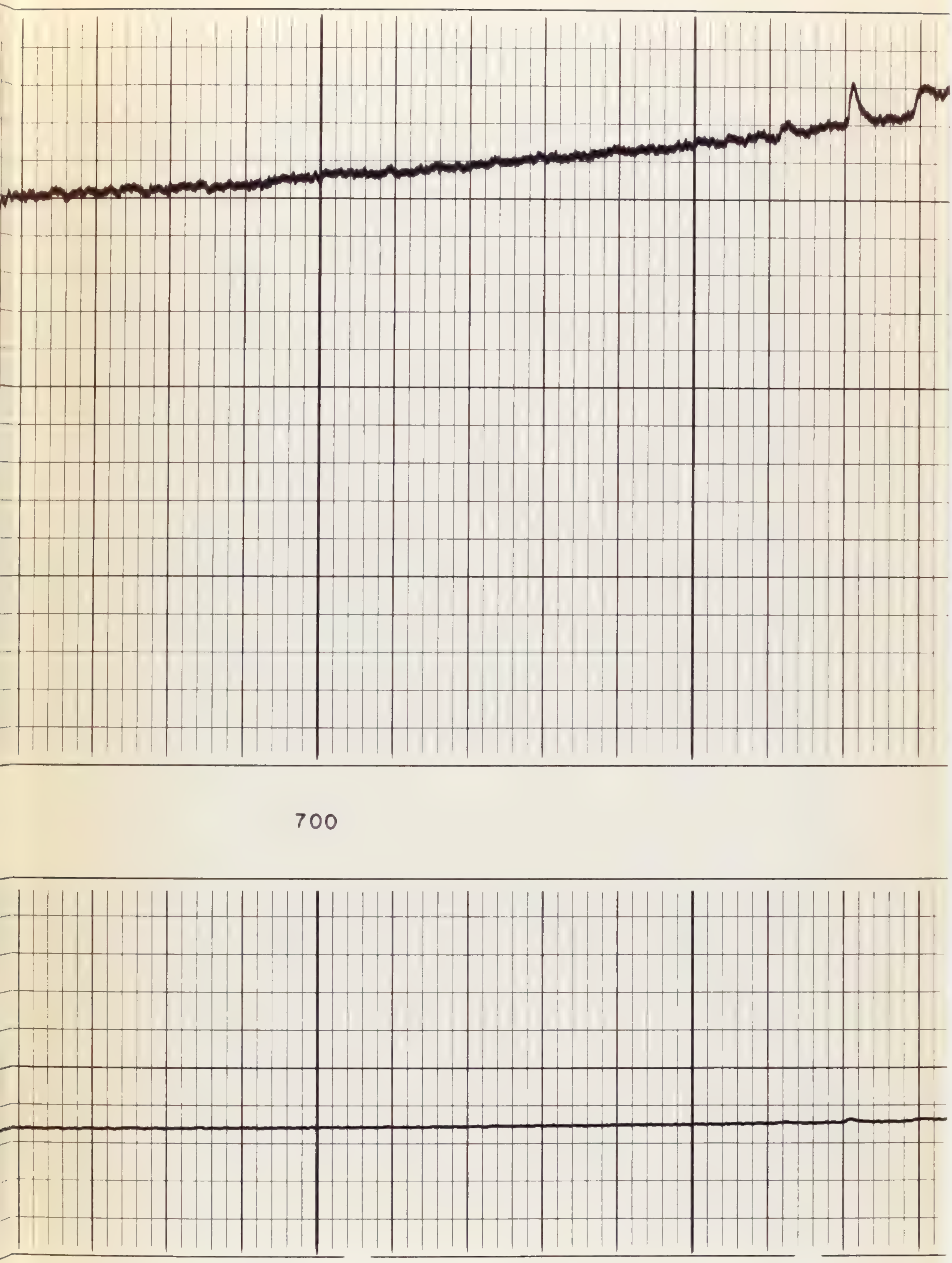
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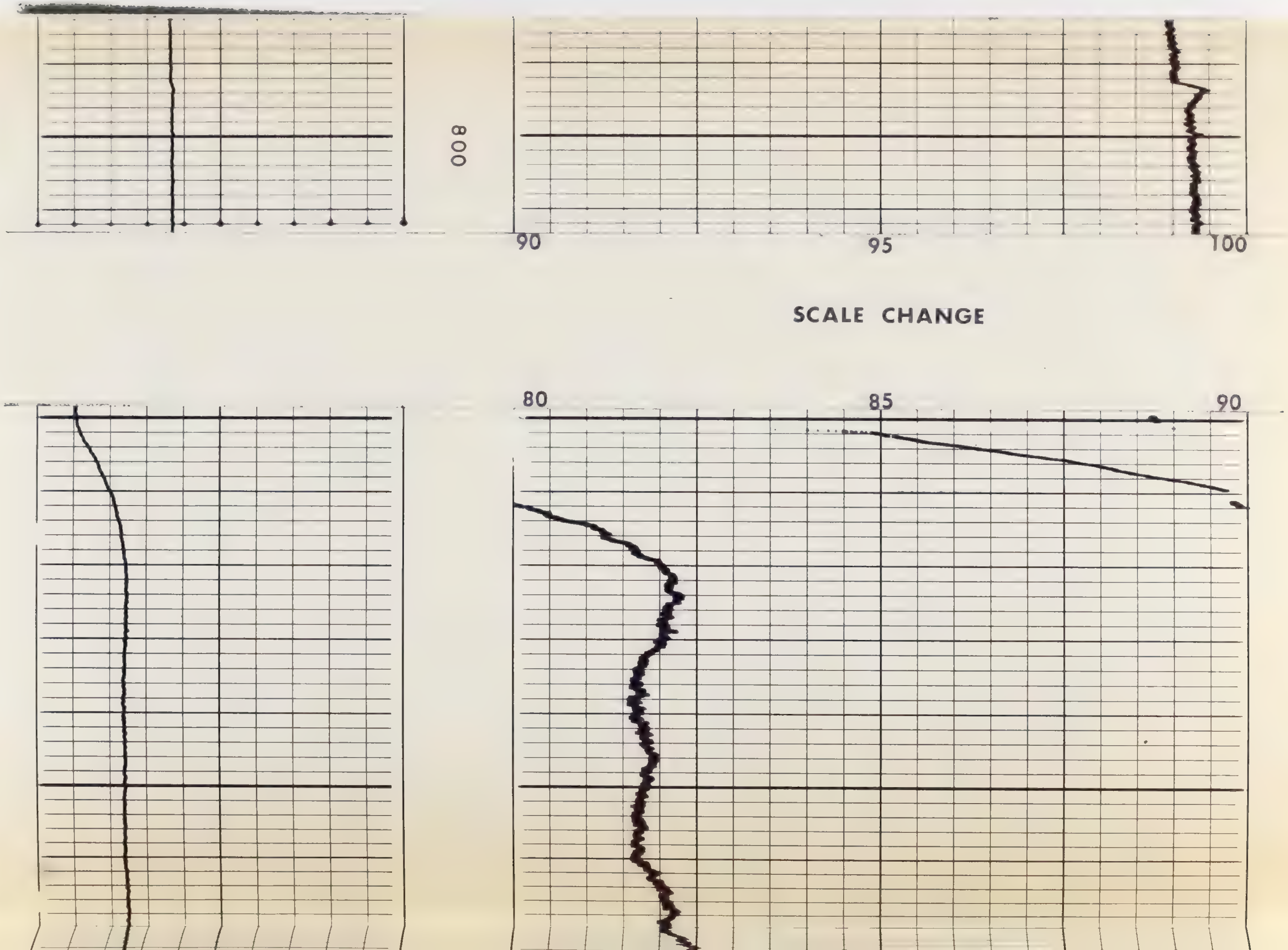
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SCALE CHANGE
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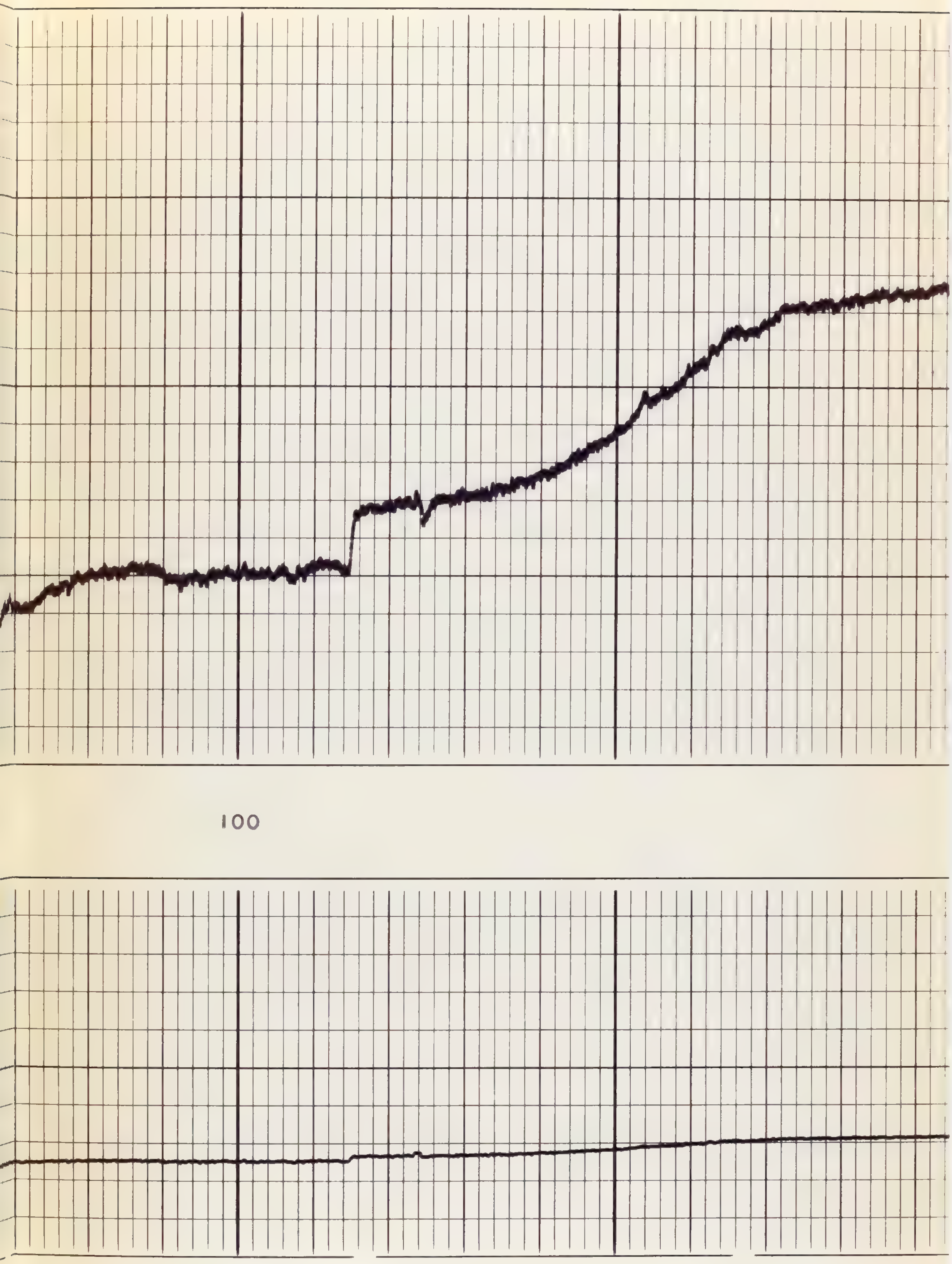
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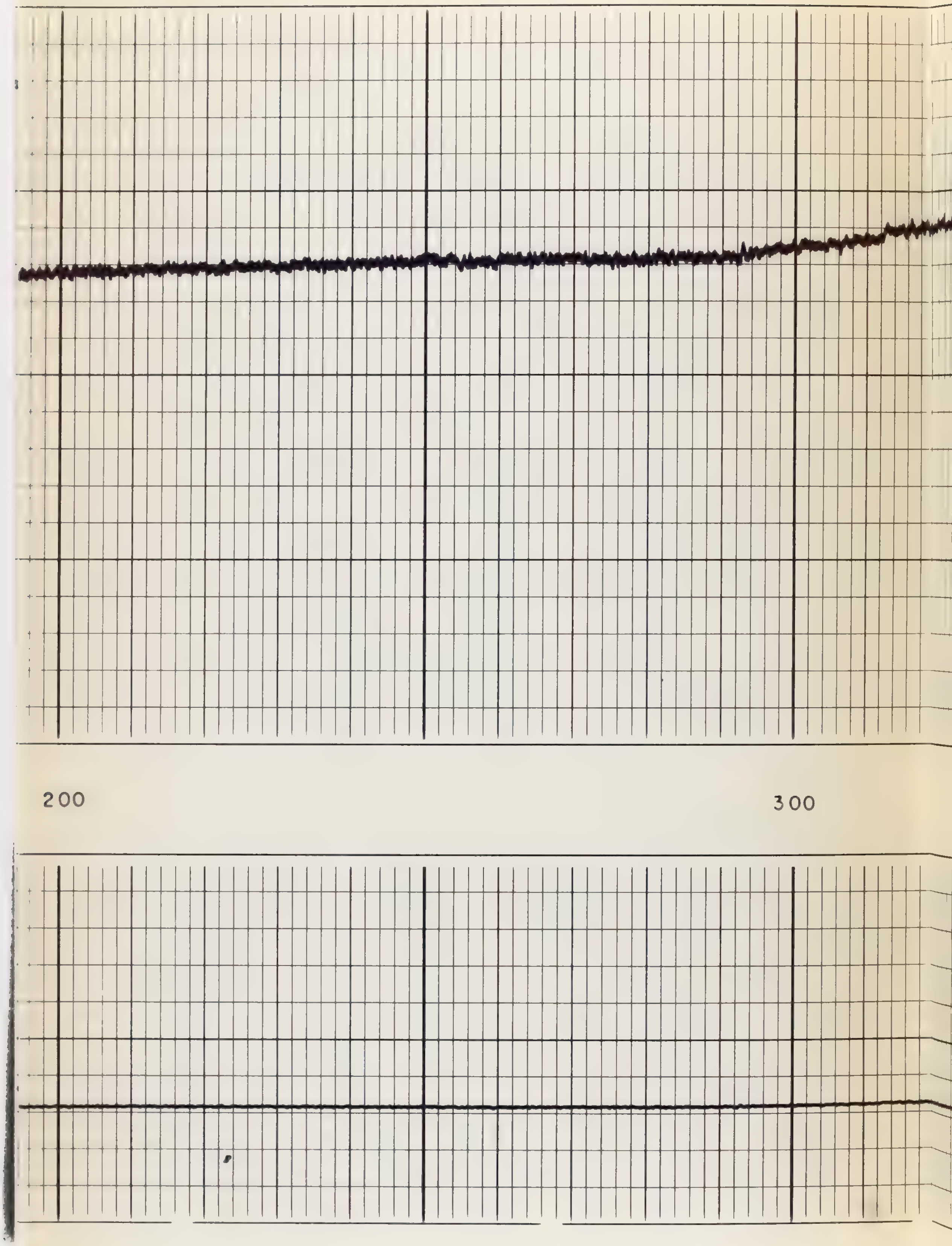
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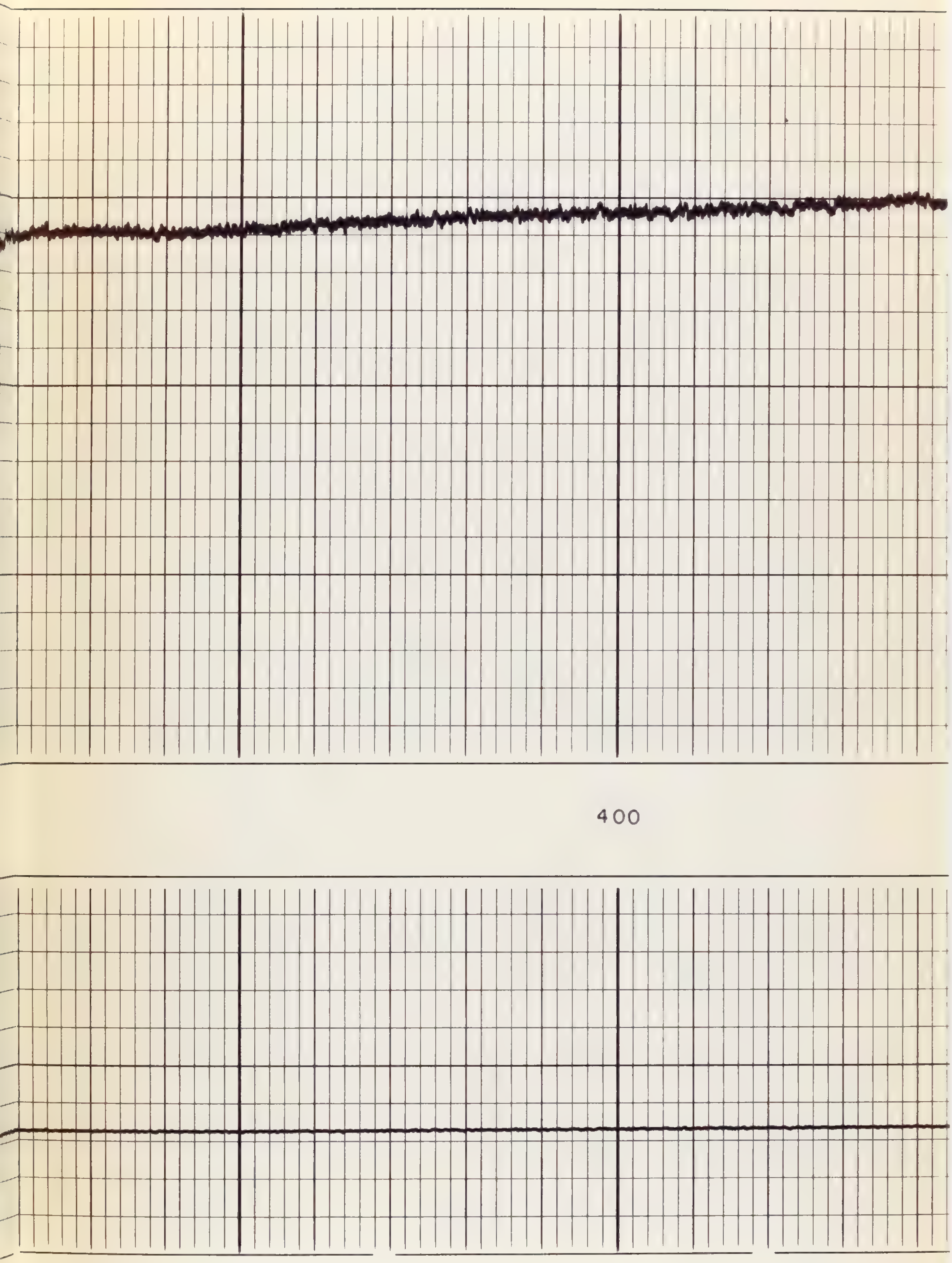
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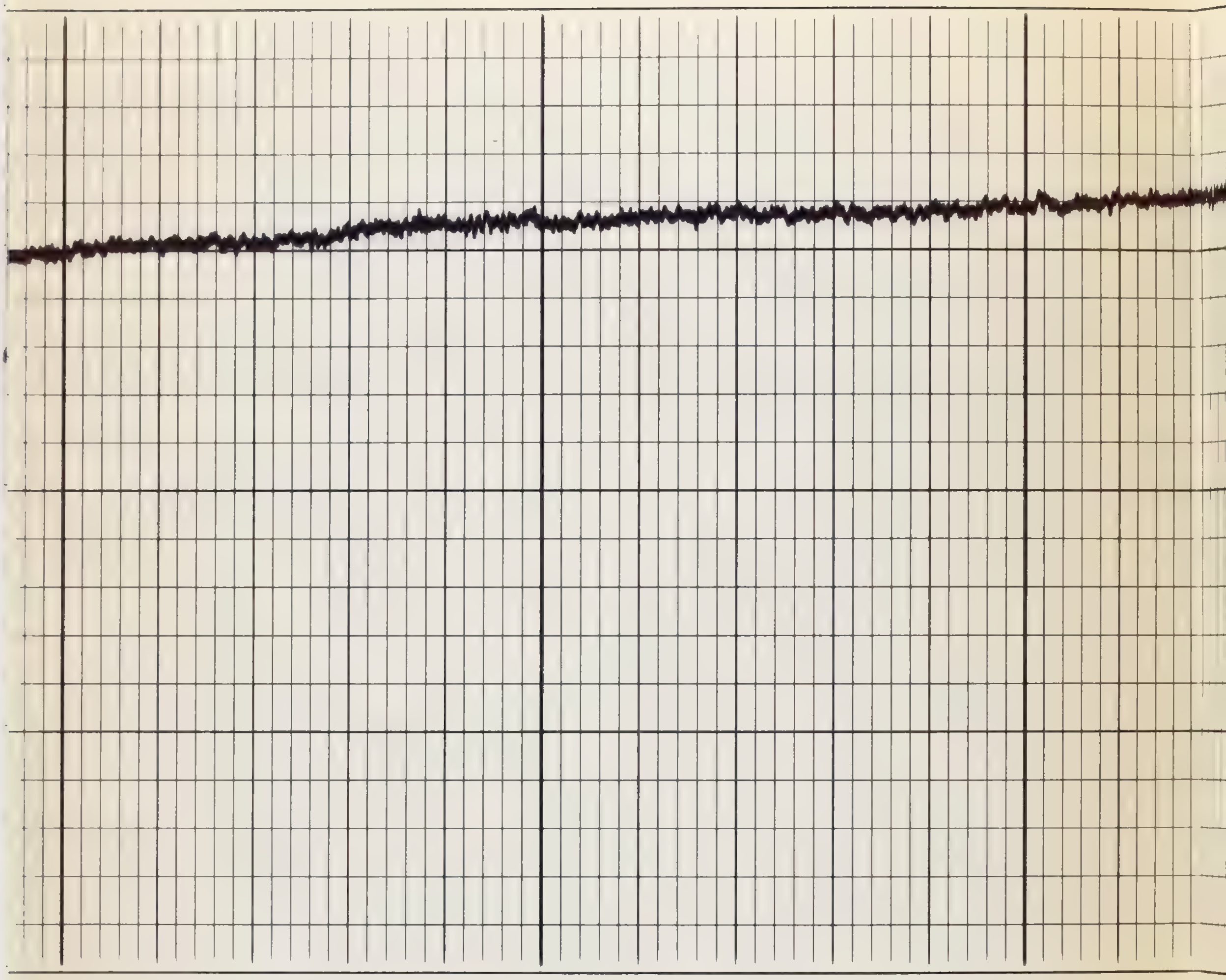

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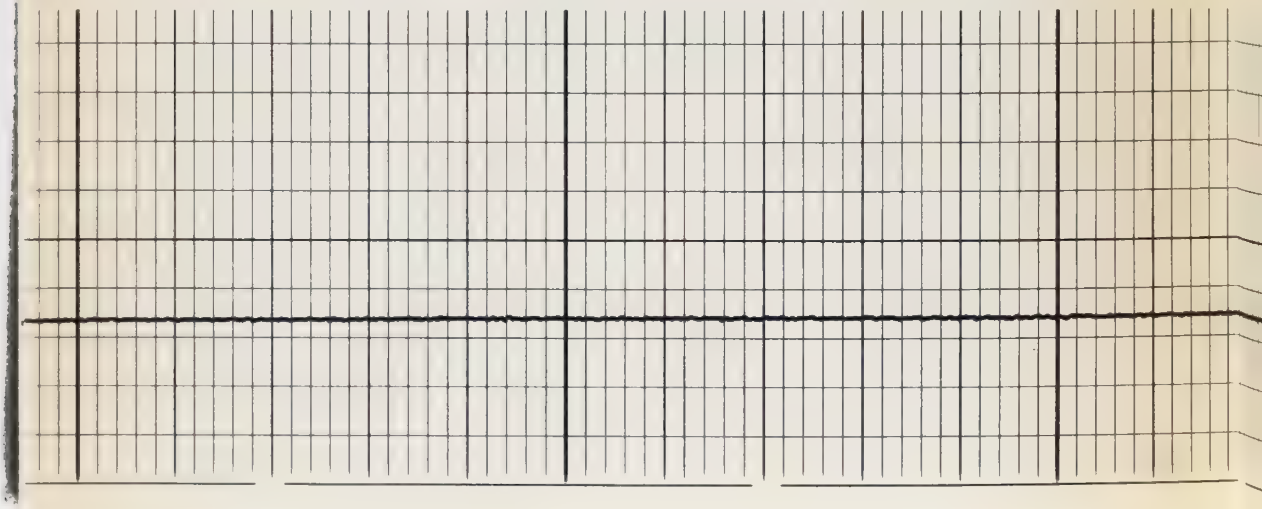

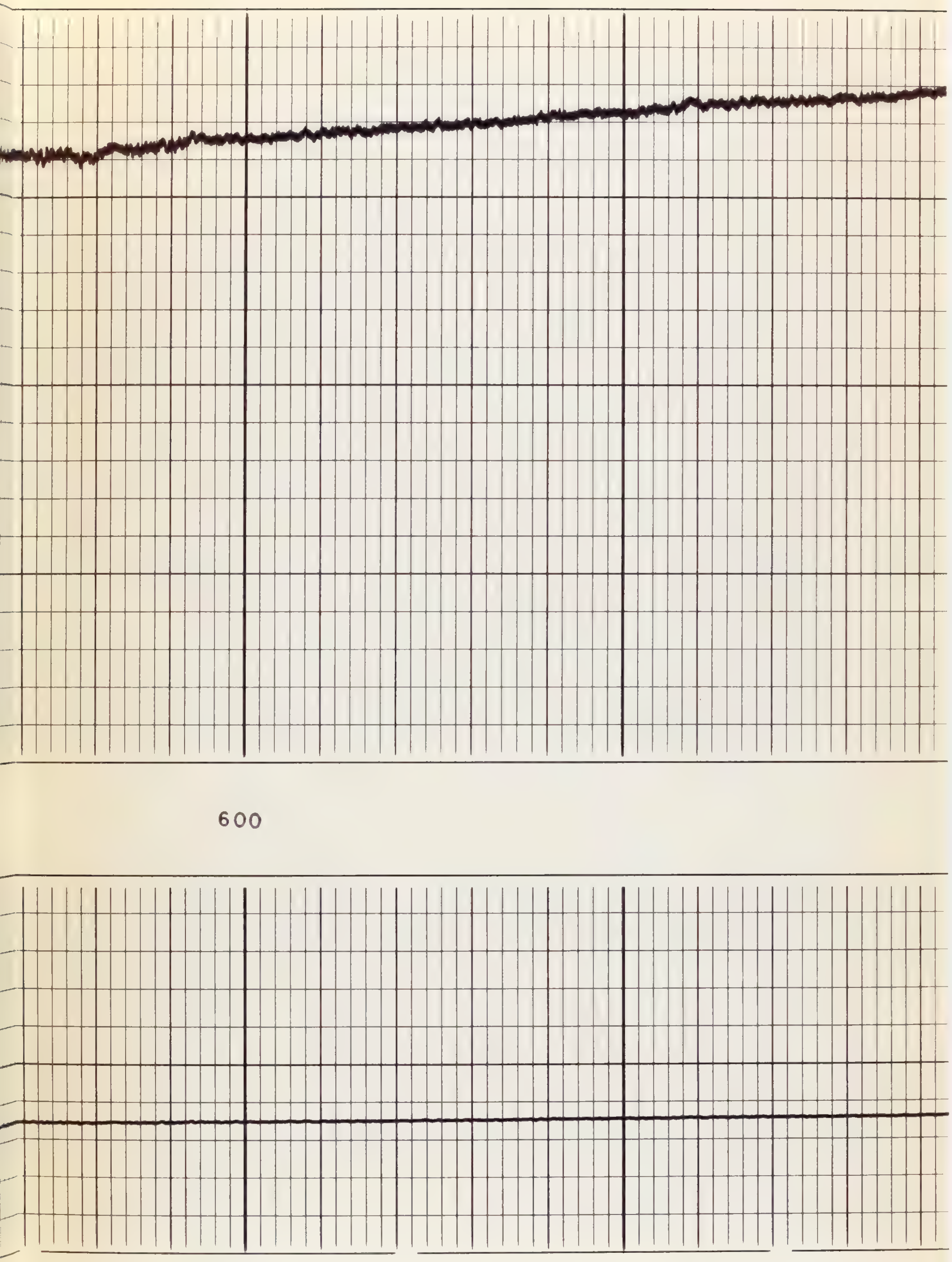
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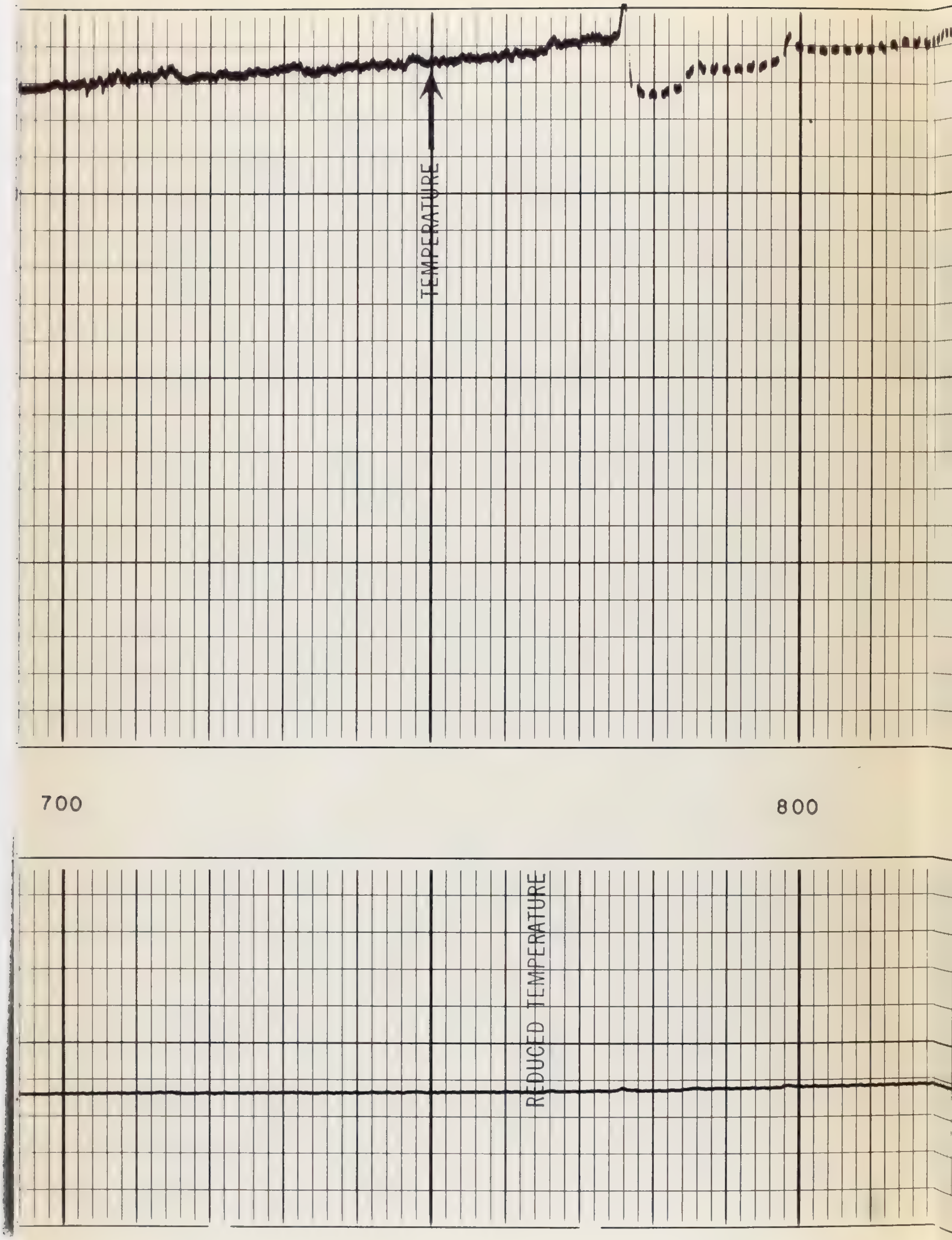
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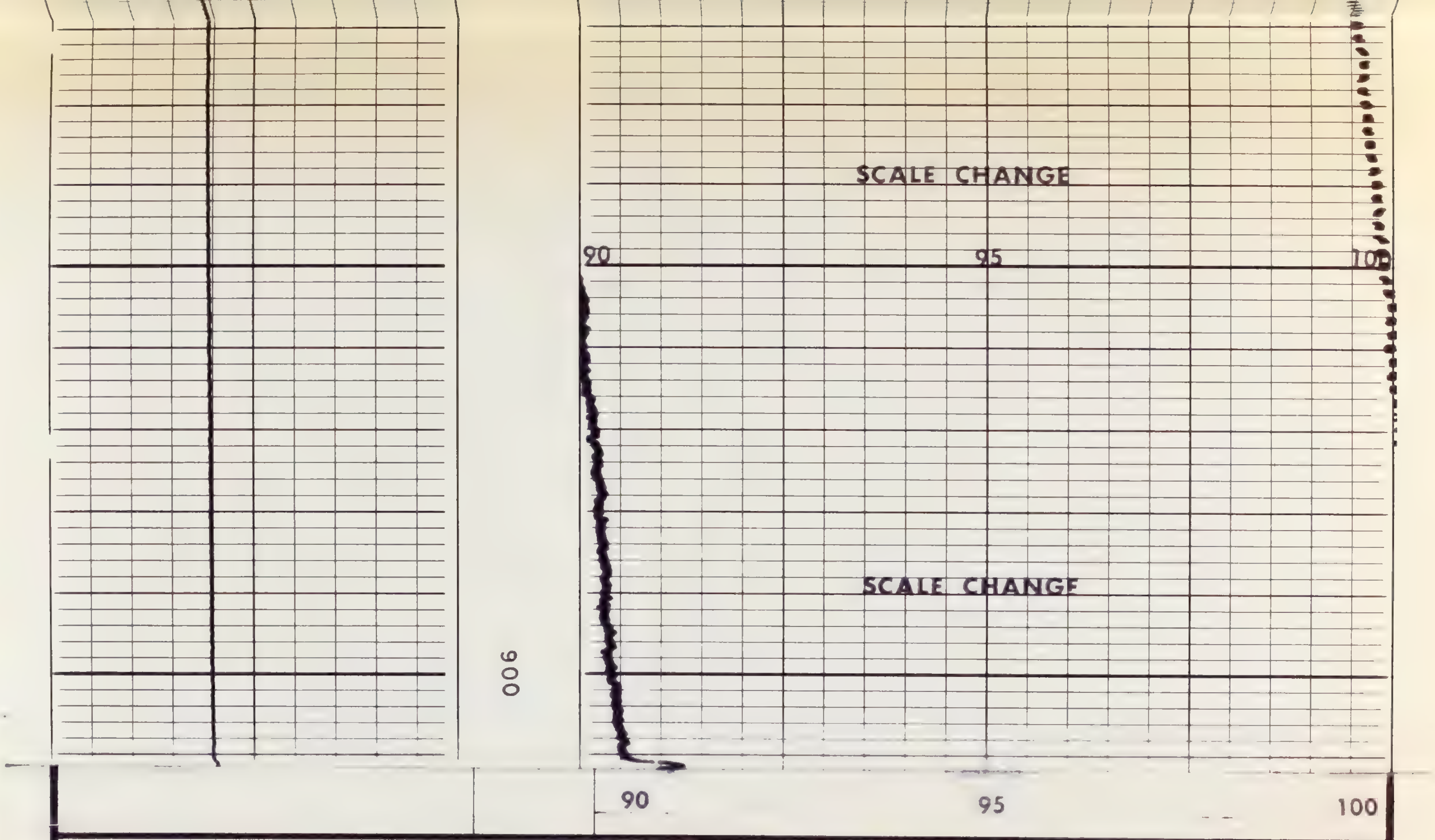
REDUCED TEMPERATURE



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COMPANY ATLANTIC RICHFIELD COMPANY

WELL [illegible]

SCHL. F. R. 912

SCHL. T. D. 912

DRLR. T. D.

FIELD SORGHUM GULCH

COUNTY RIO BLANCO STATE COLORADO

ASSAYS

Pursuant to Section 33 of Federal Lease C-20341, and section 231.5, Title 30, Part 231 of the Federal Code of Regulations the below described materials submitted by the lessee in accordance with an approved Exploration Plan has been deemed confidential and . . . .

FOR U.S. GOVERNMENT USE ONLY

Nature of material so classified:

ASSAY DATA FOR OIL CONTENT: Such material may be examined only upon expressed conscent of the Area Oil Shale Supervisor or the Lessee

II B-2 CORE ASSAY DATA

Assays of core samples are run to determine:

(1) shale oil yield
(2) soluble sodium
(3) alumina

For the determination of shale oil content, cores are sampled on one-foot intervals and these samples are subjected to laboratory analysis. Each sample is retorted through a specified time curve to yield data on oil content in gallons per ton, water content in gallons per ton, and residue weight in pounds per ton. In addition, gas-plus-loss is calculated for each sample.

Analysis for sodium is done only in the R-4 zone (on one-foot intervals), and analysis for alumina is done in both the Mahogany and R-4 zones on one-foot intervals. Sodium content is determined by leaching raw shale in water and measuring the dissolved sodium content by atomic absorption. Alumina is determined by leaching spent shale with sodium hydroxide solution and measuring the soluble alumina by atomic absorption. Alumina in spent shale is then corrected back to a raw shale basis using the Fischer assay weight loss. The laboratory data sheets for those wells on which assays were completed in the past quarter are included in this section of the report. This information, however, is CONFIDENTIAL, and is so marked.

Table II B-1 lists all assay data which have been included in quarterly reports to date.

TABLE II B-12.1

CORE ASSAY DATA

Core Hole	Oil	Sodium	Alumina
AT-1A	1	1	1
SG-9	2	2	2
SG-10	1	1	1

1, 2 = Indicates Quarterly Report in which data are located.

SODIUM, ALUMINA, AND OIL ANALYSES

CORE-HOLE SG-9

TRACT C-b

II B-13 CORE AND CUTTINGS TRACE ELEMENT ANALYSIS

The Conditions for Aprpoval for the Core Drilling and Associated Ground Water Program require "sampling of drill cuttings or core with subsequent analysis to determine occurrence of arsenic, antimony, boron, cadmium, fluoride, mercury, and selenium" until it has been determined that additional sampling and analysis would not be of significant value.

Complete information has now been developed for four wells spaced across the tract. The four wells chosen for analysis are SG-8, SG-9, SG-10, and AT-1a1; and the laboratory data sheets are included in this section. Project geologists are currently assimilating these data into a composite in order to provide a "cross-section" view of the Tract. Such a view will aid in determining the necessity for continued detailed analyses.

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SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

Job No. 83011
January 31, 1975

TOSCO
18200 West Highway 72
Golden, Colorado 80401

Attention: F. C. Haas

Analysis of 32 Pulp Samples

Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	Se (ppm)	Hg (ppm)	Cd (ppm)	F (%)
1.	SG #8 0-60'	10	<1	30	<2	.24	<.5	.10
2.	60-110'	20	<1	20	<2	.29	<.5	.11
3.	110-200'	20	1	20	5	.34	<.5	.10
4.	200-300'	10	<1	30	5	.34	<.5	.14
5.	300-400'	10	<1	30	8	.24	<.5	.078
6.	400-500'	30	1	20	5	.24	<.5	.13
7.	500-580'	30	<1	30	8	.24	<.5	.13
8.	580-685'	40	1	30	<2	.14	<.5	.18
9.	685-781.8'	50	2	20	5	.095	<.5	.19
10.	789-860'	40	1	20	<2	.22	<.5	.14
11.	860-880'	60	2	20	5	.34	<.5	.20
12.	910-938'	100	1	30	<2	.44	<.5	.17
13.	938-980'	80	2	70	<2	.29	.5	.15
14.	980-1019'	60.	<1	15	<2	.19	<.5	.16
15.	SG #8 1021.3-1097.1'	40	1	20	<2	.24	<.5	.14
16.	CB-SG #9 0-100'	10	<1	30	<2	.14	<.5	.094
17.	100-200'	<10	<1	20	<2	.095	<.5	.080
18.	200-300'	20	<1	20	<2	.05	<.5	.074
19.	300-400'	10	<1	20	<2	.14	<.5	.10
20.	400-500'	20	<1	30	<2	.095	<.5	.13
21.	500-600'	10	<1	20	2	.14	<.5	.090
22.	600-700'	10	<1	20	5	.14	<.5	.070
23.	700-800'	20	<1	20	2	.05	<.5	.086
24.	800-850'	40	<1	20	5	<.02	<.5	.10
	CB-SG #9 850-950'	30	<1	20	5	.19	<.5	.17

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Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	Se (ppm)	Hg (ppm)	Cd (ppm)	F (%)
26.	CB-SG #9 950-1050'	30	<1	30	2	.43	<.5	.13
27.	1050-1150'	50	1	30	<2	.34	<.5	.16
28.	1150-1257'	30	1	20	<2	.43	<.5	.18
29.	1257-1300'	50	2	20	<2	.07	<.5	.20
30.	1300-1339.5'	90	3	50	<2	.44	.7	.15
31.	1339.5-1380'	50	1	10	<2	.58	.5	.15
32.	CB-SG #9 1380-1458'	30	1	15	<2	.14	<.5	.14

Charles E. Thompson

Charles E. Thompson
Chief Chemist

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

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REPORT OF ANALYSIS

Part I
Job No. 83010
December 19, 1974

TOSCO
18200 West Highway 72
Golden, Colorado 80401

Attention: F. C. Haas

Analysis of 109 Pulp Samples

Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	F (%)
1.	SG #10 1299-1303	50	2	300	.075
2.	1303-1313	30	3	50	.23
3.	1313-1323	50	2	100	.18
4.	1323-1328	40	1	30	.20
5.	1328-1338	40	1	70	.15
6.	1338-1348	70	2	100	.18
7.	1348-1358	60	3	70	.13
8.	1358-1368	90	3	150	.14
9.	1368-1378	40	3	100	.16
10.	1378-1388	100	1	50	.15
11.	1388-1398	50	2	50	.17
12.	1398-1408	60	1	50	.16
13.	1408-1413	60	1	50	.18
14.	1413-1423	50	1	50	.20
15.	1423-1433	30	1	50	.12
16.	1433-1443	40	3	70	.11
17.	1443-1453	40	<1	70	.086
18.	1453-1463	60	2	50	.13
19.	1463-1473	30	1	50	.18
20.	1473-1481	50	1	70	.14
21.	1481-1491	30	2	200	.12
22.	1491-1499	30	1	100	.18
23.	1499-1510	20	1	70	.13
24.	1510-1520	20	2	50	.12
25.	SG #10 1520-1530	20	<1	50	.15

Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	F (%)
26.	SG #10 1530-1540	30	1	30	.24
27.	1540-1550	20	1	50	.34
28.	1550-1560	30	<1	50	.19
29.	1560-1570	10	<1	30	.13
30.	1570-1580	50	1	50	.12
31.	1580-1590	30	1	50	.14
32.	1590-1600	40	2	70	.11
33.	1600-1610	30	2	100	.062
34.	1610-1620	50	2	70	.076
35.	1620-1630	20	<1	70	.11
36.	1630-1640	30	3	70	.090
37.	1640-1650	20	3	70	.10
38.	1650-1660	30	3	70	.078
39.	1660-1670	30	2	70	.13
40.	1670-1680	30	1	70	.088
41.	1680-1690	30	2	70	.16
42.	1690-1700	30	1	70	.15
43.	1700-1710	30	1	100	.18
44.	1710-1720	30	1	70	.20
45.	1720-1730	40	1	70	.18
46.	1730-1740	30	1	100	.13
47.	1740-1750	40	<1	100	.16
48.	1750-1760	30	1	100	.16
49.	1760-1770	40	1	150	.20
50.	1770-1780	40	1	100	.19
51.	1780-1790	80	1	70	.14
52.	1790-1800	80	1	100	.10
53.	1800-1810	80	2	20	.076
54.	1810-1820	30	<1	20	.13
55.	1820-1830	70	2	30	.13
56.	1830-1840	40	1	20	.090
57.	1840-1850	40	1	20	.10
58.	1850-1860	80	2	20	.11
59.	1860-1870	60	2	20	.13
60.	SG #10 1870-1880	40	2	30	.17

Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	F (%)
61.	SG #10 1880-1890	40	1	30	.10
62.	1890-1900	80	2	30	.072
63.	1900-1910	60	1	30	.19
64.	1910-1920	40	1	20	.11
65.	1920-1930	70	1	30	.11
66.	1930-1940	120	2	30	.13
67.	1940-1950	60	3	30	.14
68.	1950-1960	50	2	20	.11
69.	1960-1970	50	<1	10	.094
70.	1970-1980	70	2	20	.13
71.	1980-1990	40	<1	15	.14
72.	1990-2000	40	2	20	.098
73.	2000-2010	30	2	15	.13
74.	2010-2020	40	2	20	.12
75.	2020-2030	30	1	15	.22
76.	2030-2040	40	1	10	.10
77.	2040-2050	40	1	15	.12
78.	2050-2060	40	1	20	.11
79.	2060-2067	40	1	20	.15
80.	2067-2077	90	1	20	.12
81.	2077-2087	70	1	30	.16
82.	2087-2097	90	2	30	.12
83.	2097-2107	70	3	50	.10
84.	2107-2117	80	1	20	.13
85.	2117-2122	70	2	20	.060
86.	2122-2129	110	3	30	.076
87.	2129-2140	80	2	30	.12
88.	2140-2150	80	2	30	.21
89.	2150-2160	125	3	30	.19
90.	2160-2170	90	2	30	.13
91.	2170-2180	80	3	50	.12
92.	2180-2190	60	2	50	.15
93.	2190-2200	60	3	30	.17
94.	SG #10 2200-2211	40	2	20	.10
95.	ARCO #1A-1 0-100	20	1	100	.072

Item	Sample No.	As (ppm)	Sb (ppm)	B (ppm)	F (%)
	ARCO #1A-1				
96.	100-200	10	1	100	.080
97.	200-300	<10	<1	70	.088
98.	300-400	<10	<1	70	.086
99.	400-500	10	1	70	.078
100.	500-600	10	<1	100	.085
101.	600-700	30	1	70	.064
102.	700-800	30	<1	200	.062
103.	800-880	30	<1	150	.063
104.	880-940	70	1	100	.23
105.	940-1000	70	<1	150	.10
106.	1000-1100	100	<1	70	.15
107.	1100-1200	70	<1	100	.10
108.	1200-1300	80	<1	50	.13
109.	1300-TD				
	ARCO #1A-1 1341	90	1	100	.15

for Edwin V Post
Charles E. Thompson
Chief Chemist

DEC 30 1974

TOSCO/GOLDEN

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

Part II
Job No. 83010
December 27, 1974

TOSCO
18200 West Highway 72
Golden, Colorado 80401

Attention: F. C. Haas

Analysis of 109 Pulp Samples

Item	Sample No.		Cd (ppm)	Se (ppm)
1.	SG #10	1299-1303	<.5	2
2.		1303-1313	<.5	2
3.		1313-1323	<.5	2
4.		1323-1328	<.5	2
5.		1328-1338	<.5	<2
6.		1338-1348	<.5	4
7.		1348-1358	<.5	2
8.		1358-1368	<.5	8
9.		1368-1378	<.5	8
10.		1378-1388	<.5	8
11.		1388-1398	<.5	5
12.		1398-1408	<.5	2
13.		1408-1413	<.5	8
14.		1413-1423	<.5	2
15.		1423-1433	<.5	2
16.		1433-1443	<.5	2
17.		1443-1453	<.5	<2
18.		1453-1463	<.5	5
19.		1463-1473	<.5	2
20.		1473-1481	<.5	2
21.		1481-1491	<.5	<2
22.		1491-1499	<.5	<2
23.		1499-1510	<.5	<2
24.		1510-1520	<.5	2
25.	SG #10	1520-1530	<.5	5

Item	Sample No.		Cd (ppm)	Se (ppm)
26.	SG #10	1530-1540	<.5	5
27.		1540-1550	<.5	2
28.		1550-1560	<.5	10
29.		1560-1570	<.5	2
30.		1570-1580	<.5	5
31.		1580-1590	<.5	8
32.		1590-1600	<.5	8
33.		1600-1610	<.5	2
34.		1610-1620	<.5	10
35.		1620-1630	<.5	2
36.		1630-1640	<.5	2
37.		1640-1650	<.5	<2
38.		1650-1660	<.5	2
39.		1660-1670	<.5	2
40.		1670-1680	<.5	2
41.		1680-1690	<.5	<2
42.		1690-1700	<.5	<2
43.		1700-1710	<.5	2
44.		1710-1720	<.5	2
45.		1720-1730	<.5	<2
46.		1730-1740	<.5	<2
47.		1740-1750	<.5	<2
48.		1750-1760	<.5	2
49.		1760-1770	<.5	<2
50.		1770-1780	<.5	<2
51.		1780-1790	<.5	2
52.		1790-1800	<.5	2
53.		1800-1810	<.5	2
54.		1810-1820	<.5	2
55.		1820-1830	<.5	2
56.		1830-1840	<.5	2
57.		1840-1850	<.5	2
58.		1850-1860	<.5	2
59.		1860-1870	<.5	2
60.	SG #10	1870-1880	<.5	2

Item	Sample No.		Cd (ppm)	Se (ppm)
61.	SG #10	1880-1890	<.5	<2
62.		1890-1900	<.5	2
63.		1900-1910	<.5	2
64.		1910-1920	<.5	<2
65.		1920-1930	<.5	<2
66.		1930-1940	<.5	2
67.		1940-1950	<.5	<2
68.		1950-1960	<.5	2
69.		1960-1970	<.5	2
70.		1970-1980	<.5	<2
71.		1980-1990	<.5	2
72.		1990-2000	<.5	2
73.		2000-2010	<.5	2
74.		2010-2020	<.5	2
75.		2020-2030	<.5	<2
76.		2030-2040	<.5	<2
77.		2040-2050	<.5	2
78.		2050-2060	<.5	2
79.		2060-2067	<.5	<2
80.		2067-2077	<.5	4
81.		2077-2087	<.5	4
82.		2087-2097	<.5	4
83.		2097-2107	<.5	4
84.		2107-2117	<.5	2
85.		2117-2122	<.5	2
86.		2122-2129	<.5	<2
87.		2129-2140	<.5	<2
88.		2140-2150	<.5	4
89.		2150-2160	<.5	5
90.		2160-2170	<.5	2
91.		2170-2180	<.5	4
92.		2180-2190	<.5	2
93.		2190-2200	<.5	2
94.	SG #10	2200-2211	<.5	2
95.	ARCO #1A-1	0-100	<.5	2

Item	Sample No.		Cd (ppm)	Se (ppm)
96.	ARCO #1A-1	100-200	<.5	<2
97.		200-300	<.5	2
98.		300-400	<.5	<2
99.		400-500	<.5	<2
100.		500-600	<.5	<2
101.		600-700	<.5	2
102.		700-800	<.5	<2
103.		800-880	<.5	<2
104.		880-940	<.5	2
105.		940-1000	<.5	2
106.		1000-1100	<.5	2
107.		1100-1200	<.5	2
108.		1200-1300 <	<.5	2
109.	ARCO #1A-1	1300-TD 1341	<.5	2

Edwin V. Post
for Charles E. Thompson
Chief Chemist

SKYLINE LABS, INC.
SPECIALISTS IN EXPLORATION GEOCHEMISTRY
12090 WEST 50TH PLACE • WHEAT RIDGE, COLORADO 80033 • TEL.: (303) 424-7718

REPORT OF ANALYSIS

Part III
Job No. 83010
December 31, 1974

TOSCO
18200 West Highway 72
Golden, Colorado 80401

Attention: F. C. Haas

Analysis of 109 Pulp Samples

Item	Sample No.	Hg (ppm)	Item	Sample No.	Hg (ppm)
1.	SG #10 1299-1303	.36	26.	SG #10 1530-1540	.35
2.	1303-1313	.18	27.	1540-1550	.35
3.	1313-1323	.35	28.	1550-1560	.31
4.	1323-1328	.26	29.	1560-1570	.35
5.	1328-1338	.26	30.	1570-1580	.40
6.	1338-1348	.26	31.	1580-1590	.24
7.	1348-1358	.45	32.	1590-1600	.34
8.	1358-1368	.35	33.	1600-1610	.19
9.	1368-1378	.31	34.	1610-1620	.24
10.	1378-1388	1.0	35.	1620-1630	.095
11.	1388-1398	.44	36.	1630-1640	.24
12.	1398-1408	.45	37.	1640-1650	.19
13.	1408-1413	.31	38.	1650-1660	.24
14.	1413-1423	.31	39.	1660-1670	.24
15.	1423-1433	.31	40.	1670-1680	.24
16.	1433-1443	.26	41.	1680-1690	.19
17.	1443-1453	.35	42.	1690-1700	.24
18.	1453-1563	.31	43.	1700-1710	.24
19.	1463-1473	.35	44.	1710-1720	.19
20.	1473-1481	.26	45.	1720-1730	.24
21.	1481-1491	.35	46.	1730-1740	.24
22.	1491-1499	.31	47.	1740-1750	.34
23.	1499-1510	.22	48.	1750-1760	.19
24.	1510-1520	.31	49.	1760-1770	.19
25.	SG #10 1520-1530	.44	50.	SG #10 1770-1780	.14

Item	Sample No.		Hg (ppm)	Item	Sample No.		Hg (ppm)
51.	SG #10	1780-1790	.14	81.	SG #10	2077-2087	.095
52.		1790-1800	.31	82.		2087-2097	.34
53.		1800-1810	.29	83.		2097-2107	.19
54.		1810-1820	.14	84.		2107-2117	.14
55.		1820-1830	.38	85.		2117-2122	.38
56.		1830-1840	.095	86.		2122-2129	.14
57.		1840-1850	.34	87.		2129-2140	.14
58.		1850-1860	.19	88.		2140-2150	.19
59.		1860-1870	.29	89.		2151-2160	.34
60.		1870-1880	.19	90.		2160-2170	.34
61.		1880-1890	.14	91.		2170-2180	.38
62.		1890-1900	.19	92.		2180-2190	.48
63.		1900-1910	.14	93.		2190-2200	.43
64.		1910-1920	.19	94.	SG #10	2200-2211	1.3
65.		1920-1930	.24	95.	ARCO #1A-1	0-100	.29
66.		1930-1940	.095	96.		100-200	.14
67.		1940-1950	.19	97.		200-300	.14
68.		1950-1960	.14	98.		300-400	.24
69.		1960-1970	.14	99.		400-500	.19
70.		1970-1980	.24	100.		500-600	.14
71.		1980-1990	.24	101.		600-700	.05
72.		1990-2000	.14	102.		700-800	.095
73.		2000-2010	.24	103.		800-880	.14
74.		2010-2020	.24	104.		880-940	.19
75.		2020-2030	.24	105.		940-1000	.19
76.		2030-2040	.19	106.		1000-1100	.19
77.		2040-2050	.14	107.		1100-1200	.29
78.		2050-2060	.19	108.		1200-1300	.24
79.		2060-2067	.19	109.	ARCO #1A-1	1300TD-1341	1.1
80.	SG #10	2067-2077	.29				

for Edwin V. Post
Charles E. Thompson
Chief Chemist

Rock Mechanics

Gas Samples

II B-14 ROCK MECHANICS

Rock mechanics test data are being obtained and analyzed by Golder Associates, Inc. No reports beyond those presented in Quarterly Report #1 have been received in time for inclusion in this report. It is expected that Quarterly Report #3 will contain more rock mechanics data.

Gas Samples

II B-15 GAS SAMPLES
TRACT C-b GAS SAMPLING PROGRAM

Purpose

The basic purpose of the C-b gas sampling program is to obtain enough information concerning occurrence of methane or other gases on the C-b lease tract to allow proper evaluation of the feasibility and economics of underground mining on the Tract.

Discussion

In achieving the objective above, we do not have the advantage of information from, or past experience in, mines in the same area to guide us. As a result, the approach must be taken that any opportunity to gather data should be taken advantage of. Of necessity, an approach of attempting to gather all data available must be used, sometimes without a clear idea of how useful the data obtained will be. As a result, it becomes extremely important to analyze and interpret the data as soon as data are available in order to modify existing programs and develop new ones as the need becomes apparent. With this type of approach, a general picture of gas occurrence and characteristics should be obtained, hopefully in enough detail to allow some sort of quantitative evaluation of gas influx into an underground mine on the Tract.

In order to obtain this information, there are several areas in which data are being gathered. These are as follows:

(1) Vertical and NQ (slant) core drilling

Gas samples are being taken as specified by the lease stipulations. (Refer to Quarterly Report #1.) In addition, Baroid gas detectors are being used to provide a continuous record of gas concentration during the drilling operation.

(2) Core Testing

Core samples are now being tested through the use of a procedure outlined in U. S. Bureau of Mines Report of Investigation RI 7767 ("The Direct Method of Determining Methane Content of Coal Beds for Ventilation Design" by F. N. Kissell, C. M. McCulloch, and C. H. Elder, 1973) to evaluate gas content.

(3) Aquifer Test

Data concerning gas content in water pumped during the aquifer test were gathered using a gas-water separator and gas metering equipment.

> Data gathered from the above sources are incomplete at present, and no analysis, interpretation or evaluation of the data has yet been made. In the interest of presenting useful and comprehensive information, rather than a fragmented package of incomplete data, no data from the gas sampling programs listed above are included in this report. An interim report on the gas sampling program is currently being prepared and should be ready for inclusion in Quarterly Report #3.

Presenting the same type of data found in Quarterly Report #1, the following tables should be examined in the same manner as those found in Quarterly Report #1.

The following tables list the results of lab analysis of the cylindrical bomb grab samples, and the copies of strip charts show the results from the Baroid continuous analyzer. Caution: These data should be used in a QUALITATIVE sense only. We feel that the numbers reported here are meaningless in a QUANTITATIVE sense; they do not tell us: (1) how much gas was coming up the hole (we have only the composition of a small split of the total gas volume which was comprised of down-hole gas mixed with an uncertain amount of circulating drilling air), (2) at exactly what depth down the long open hole during drilling any gas was being released (this is important since only gas near the relatively thin mining zone is of practical consequence), or (3) how the gas is contained underground. With regard to this last point, the gas could be (a) in solution in the groundwater, (b) contained in open fractures and joints and trapped there by the groundwater, or (c) actually trapped in the rock pore spaces. In the event of "a" or "b" above, it is quite probable that a dewatering program could also degas the interval to be mined.

Please refer to Quarterly Report #1, Page II B-493 for an explanation of Baroid Gas Plots.

ANALYSIS OF GAS SAMPLES FROM TRACT C-b
SORGHUM GULCH CORE HOLES
November, 1974 - January, 1975 (1)

Core Hole	Description	Date	Depth (ft.)	Methane (Mole %)	Ethane (vppm)	Balance Air
AT-10	Aquifer test well:					
	No. 1, 1615 hr.	12/ 5/74	-	44.38	3300	Air
	No. 2, 1800 hr.	12/ 7/74	-	53.44	2800	Air
SG-1	Base of Parachute Creek	12/ 1/74	2222	0.004	-	Air
	1200 hr.	12/ 5/74	2484	3.89	12	Air
SG-8	Upper Aquifer 1 of 1 Jetting Pkr set @ 950 ft.	12/17/74	950	6.43	41	Air
	Lower Aquifer 1 of 1 Pkr set @ 1910 ft.	12/14/74	1910	18.97	201	Air
	1 of 1 3200 mΩ	11/26/74	2563	5.79	8	Air
SG-17	No. 10 DST 1 of 1 1164-1212 ft.	11/24/74	1164-1212	0.17	-	Air
	No. 11 DST 1 of 1 1200-1224 ft.	11/24/74	1200-1224	0.05	-	Air
	1 of 1 1224-1250 ft.	11/27/74	1224-1250	0.01	-	Air
	10 ft. below top of mining zone 1 of 1 1250 ft.	11/27/74	1250	0.28	-	Air
	10 ft. below mine roof 1261 ft.	11/27/74	1261	0.45	-	Air
	No. 17 DST 1 of 1 1308-1336 ft.	12/ 2/74	1308-1336	0.11	-	Air
	No. 18 DST 1 of 1 1373 ft.	12/ /74	1373	0.07	-	Air
	No. 19 DST 1 of 1 1423-1470 ft.	12/ 6/74	1423-1470	0.07	-	Air
	No. 21 DST 1 of 1 1473-1522 ft.	12/10/74	1473-1522	0.01	-	Air
SG-17	1514-1572 ft. DST #23	12/12/74	1514-1572	.018	-	Air
	1561-1622 ft. DST #24	12/14/74	1561-1622	.01	-	Air
	1622 ft. H_2O Test	12/13/74	1622	.26	-	Air
	1618-1670 ft. DST #25	12/15/74	1618-1670	NA*	NA*	NA*
	1711-1770 ft. DST #27	12/18/74	1711-1770	.02	2	Air
	1768-1820 ft. DST #28	12/20/74	1768-1820	.03	-	Air
	1869-1920 ft. DST #30	12/28/74	1869-1290	10 vppm	<2	Air
	1918-1970 ft. DST #31	12/30/74	1918-1970	0.01	<2	Air
	2030 ft., 8 ft. below lower rich		2030	0.07	5	Air
	2050 ft.		2050	0.87	2	Air
	2070 ft. ≃ 10 ft. above base lower rich		2070	1.34	40	Air
	2120-2170 ft. DST #34	1/ 4/75	2120-2170	0.39	3	Air
	2040 ft.		2040	1.18	-	Air
	Core bottle gas (3), 1030-1130 hr.	12/16/74	1683	.31 (4),	-	Air

ANALYSIS OF GAS SAMPLES FROM TRACT C-b
SORGHUM GULCH CORE HOLES
November, 1974 - January, 1975 (1)

Core Hole	Description	Date	Depth (ft.)	Methane (Mole %)	Ethane (vppm)	Balance Air
SG-20	Top of Para. Creek 1 of 1 515 ft.	12/ 4/74	515	0.02	-	Air
	0204 hr. 1 of 1 850 ft.	12/ 6/74	850	1.08	-	Air
	Well flowing 0715 hr. 875 ft.	12/ 6/74	875	77.17	-	Air
	No. 2 DST T.D. 1 of 1 981.5 ft.	12/10/74	981.5	0.20	-	Air
	Jetting test @ T.D. 1 of 1		-	6.10	43	Air
SG-21	Top of Para. Creek 1 of 1 676 ft. 1 of 1	12/16/74	-	0.0002	-	Air
	980 ft	12/18/74	980	0.0641	-	Air
	No. 1 DST 1 of 1 1000-1035	12/19/74	100-1035	0.0077	-	Air
	Jetting Test 1035 ft.	1/ 2/75	1035	0.17	-	Air

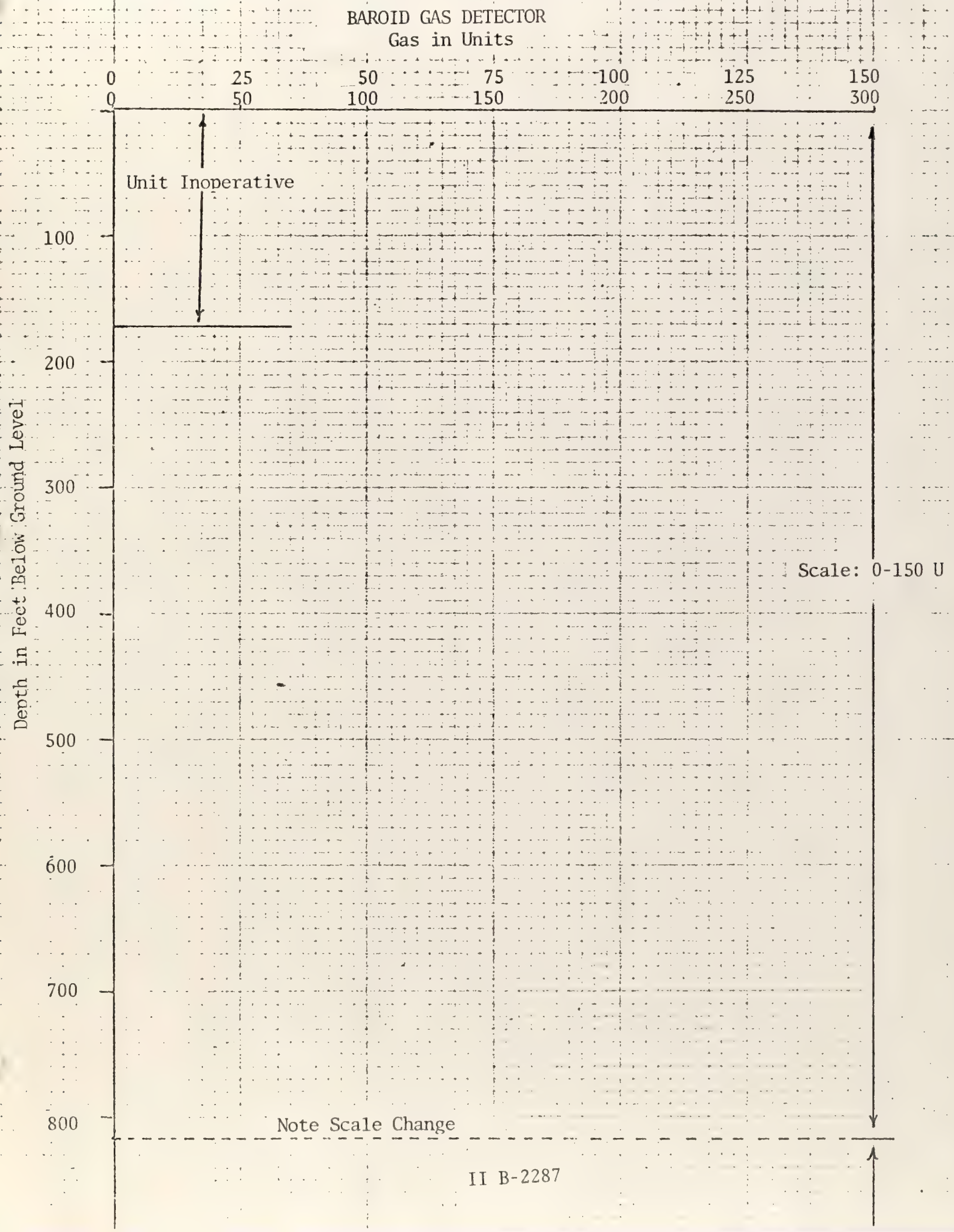
(1) No H_2, CO, CO_2, H_2S, or heavier hydrocarbons were found in any of the samples.

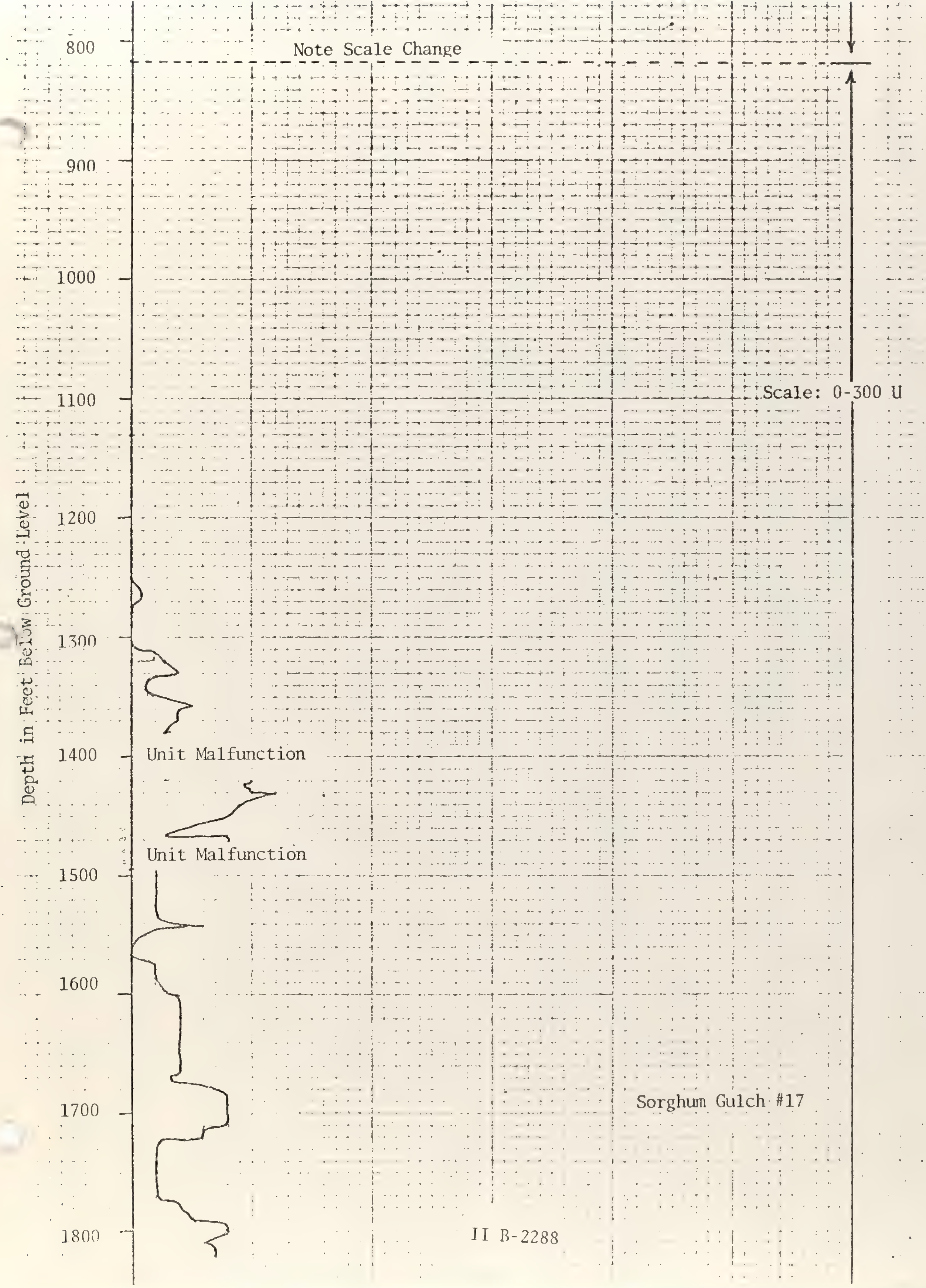
(2) Caution: Data should be treated as QUALITATIVE only (see discussion).

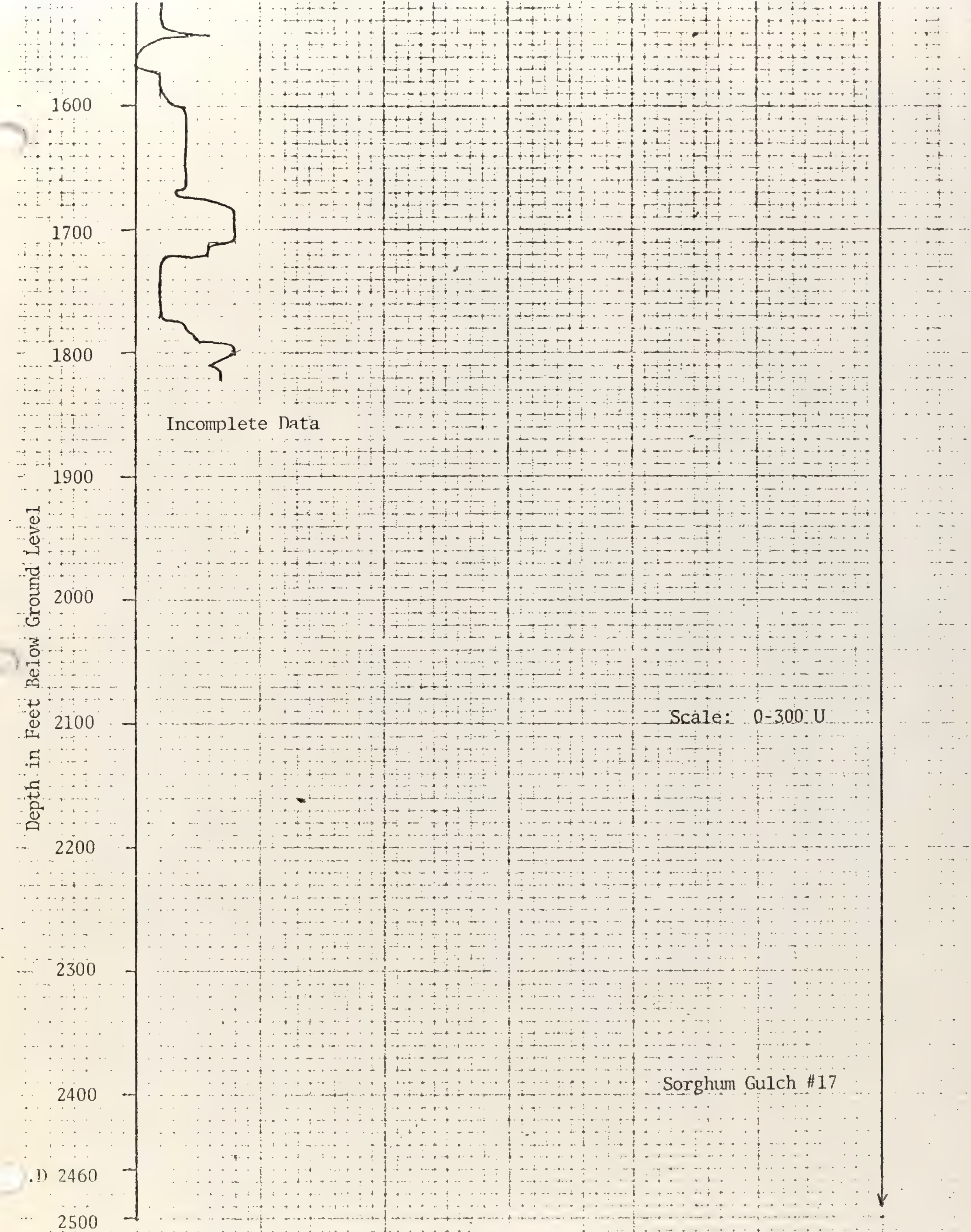
(3) Gas sample collected from gas evolved from core utilizing method outlined in RI 7767.

(4) Sample also contained 0.08 mole % CO_2.

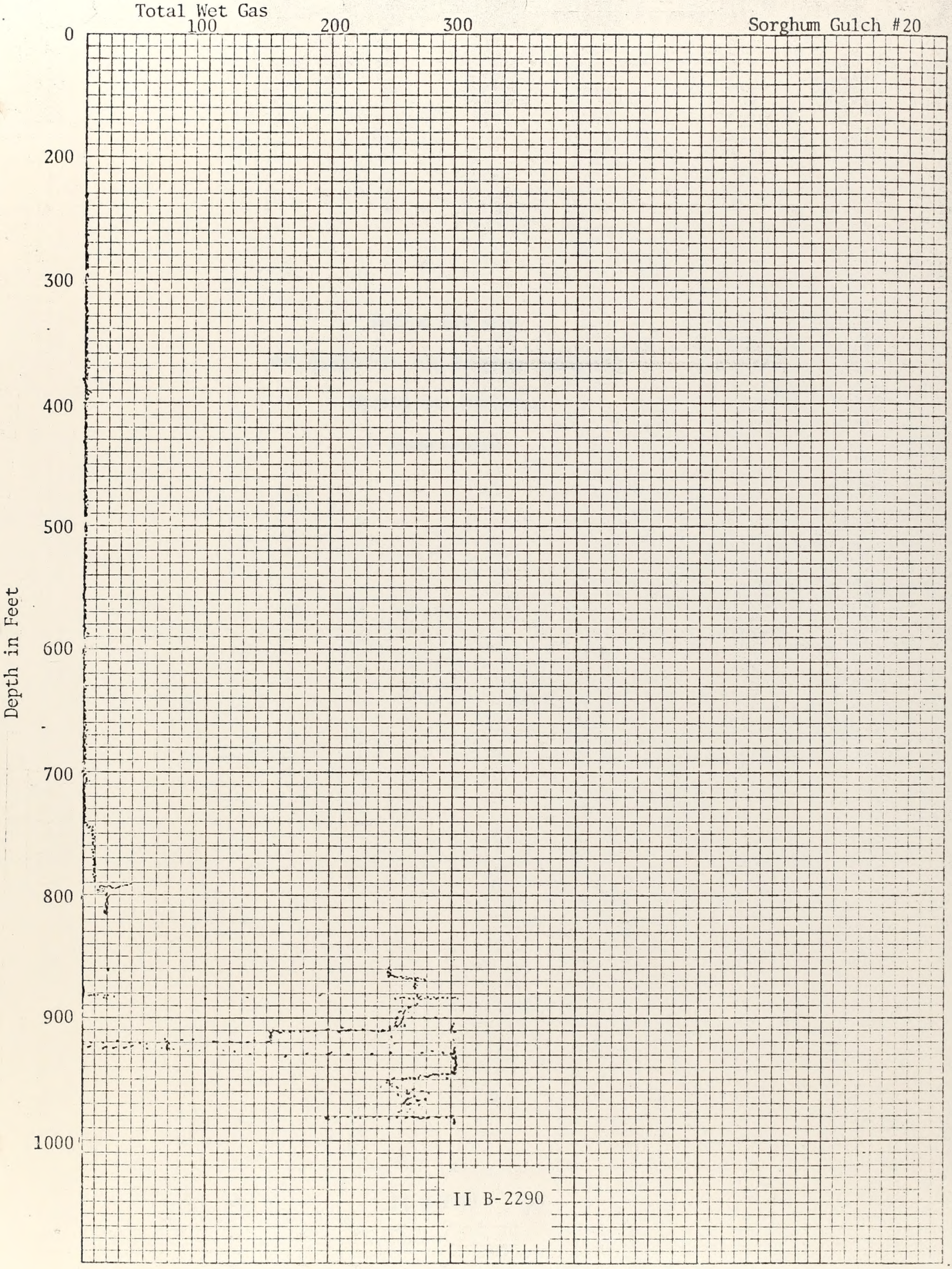
ARCO ET AL. SORGHUM GULCH #17
Section 16-35-96W El. 7036
Depth vs. Gas in Units




800
Note Scale Change
900
1000
1100
Scale: 0-300 U
1200
Depth in Feet Below Ground Level
1300
1400
Unit Malfunction
Unit Malfunction
1500
1600
1700
Sorghum Gulch #17
1800



3000 Total Wet Gas Units = 100% Methane



II B-2290

3000 Total Wet Gas Units = 100% Methane

Bariod Gas Plot

Not Available for Sorghum Gulch #21

Baroid Gas Detector

Inoperative